A

GENERAL HISTORY

OF

INLAND NAVIGATION.



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A

GENERAL HISTORY

OF

INLAND NAVIGATION,

FOREIGN AND DOMESTIC:

CONTAINING

A COMPLETE ACCOUNT OF THE CANALS ALREADY EXECUTED IN ENGLAND, WITH CONSIDERATIONS ON THOSE PROJECTED.

TO WHICH ARE ADDED,

PRACTICAL OBSERVATIONS.

THE WHOLE ILLUSTRATED WITH A MAP OF ALL THE CANALS IN ENGLAND, AND OTHER USEFUL PLATES.

By J. PHILLIPS.

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PREFACE.

THE utility of inland navigations is now ſo generally acknowledged, and ſo ſatisfactorily proved by the beneficial effects of thoſe which have been already completed, that it ſeems ſcarcely neceſſary to ſay any thing on the ſubject. The canal begun by his Grace the Duke of Bridgwater, in 1759, has ſo evidently ſhewn the great advantages to be derived from ſuch works, and given birth to ſo many ſimilar projects, that ſince that time more than forty acts of parliament have been paſſed for making and perfecting canals, or for improving the inland navigation of this country; and ſeveral more petitions, for the ſame purpoſe, are now before parliament.

Inland navigation is highly beneficial to trade and commerce, by facilitating the communication between widely diſtant parts of the kingdom, reducing the price of carriage, and thus enabling the manufacturer to obtain his materials, fuel, and neceſſaries of life, at a lower rate, to convey his goods to market at a leſs expence, and conſequently to ſell cheaper than his competitors. In countries which have the advantage of canals, the old manufactures are rendered more flouriſhing, and new ones eſtabliſhed, from day to day, in ſituations where the land before was of little value, and but thinly inhabited. They render the countries

through which they paſs more rich and fertile; ſince every meadow or paſture which they flow through diſplays a verdure never ſeen in the withered and aduſt ſpots that are at a diſtance from the banks of rivers and running waters. The merchants who reſide at the ports where they terminate muſt alſo derive very conſiderable advantages from them, as they are enabled by them to export greater quantities of goods from places at a diſtance from the ſea, and to ſupply with eaſe a greater extent of inland country with the commodities they import from foreign nations.

There are, perhaps, few objects of internal policy, that have ſo much called forth the powers and reſources of the country, as canals. They have not only been the means of enlarging our foreign commerce, but of giving birth to an internal trade, which, with all the advantages attendant on foreign commerce, has perhaps far exceeded it in extent, value, and importance. So great has been the effect which theſe canals, and the trade to which they have given birth, have had on our induſtry, population, and reſources, that in many inſtances they have entirely changed the appearance of the counties through which they paſs.

The reaſons of this change are ſufficiently obvious. As conſumers, by means of canals we are enabled to import more cheaply; as producers, we export with greater facility. Do the materials of a manufacture lie diſperſed? Canals unite them, and at the ſame time ſupply the perſons employed in it with every neceſſary at the cheapeſt rate; and the land-owner, whether we

conſider

conſider the ſurface of the ſoil, or the mines in its bowels, neceſſarily finds his advantage from new markets, and from having a cheaper carriage both for his productions and his manure.

The experiment has now been made for ſome years, and canals have been cut to an extent of near a thouſand miles, and in moſt caſes to the advantage of the public, even where they have not been gainful to the individuals concerned in them. In ſome parts of the country prejudices ſtill prevail; and the popular objection, that inland navigations tend to diminiſh the number of our ſeamen, has frequently influenced the minds of thoſe who were not biaſſed by any particular private intereſt. In ſome inſtances the coaſting navigation may have been leſſened by them (though this has not been proved, and ſtill remains doubtful), but in others it has been increaſed; and there can be no doubt that a greater extenſion of our diſtant navigation has ariſen from a ſyſtem which has, in effect, converted the internal parts of our iſland into coaſts.

To the cheapneſs of conveyance, compared with land-carriage, ſhould be added the advantages attendant on an eaſy and ſecure communication of the different parts of the country one with another, during the tempeſtuous months, and in times of war; when veſſels from the northern parts of Europe will readily make the Humber, from whence, by means of canals, there is a communication with the rivers Merſey, Dee, Severn, Avon, Thames, &c. an extent of water-carriage exceeding five hundred miles, interſecting

the

the whole interior part of the kingdom; and by which merchandiſe may be imported and exported with perfect ſafety from boiſterous weather or obtruding enemies. The greateſt advantages alſo may be expected to reſult from ſafe and ſpeedy communications between the eaſt and weſt parts of this iſland, by means of that grand undertaking the Forth and Clyde navigation. And if the propoſed canals through the county of Hampſhire ſhould take place (which I hope I ſhall live to ſee), goods and ſtores of all kinds, from the magazines of London, Woolwich, &c. may then with certainty be conveyed to Portſmouth; thereby avoiding a long, circuitous, and hazardous navigation. Similar advantages will attach to many other places, which I ſhall not now enumerate, as they muſt ſtrike the eye, and convince the judgment of every one who inſpects the map.

The bargemen and boatmen, though they have little experience in boiſterous ſeas, are by no means unacquainted with the art of managing and loading veſſels, and frequently find their way into our ſea-ports, and thence on board our ſhips. But however little inland navigation may be ſuppoſed to form navigators for the ſea, no lives are loſt in the calm element on which they are employed; the diſeaſes of hot countries, ſo deſtructive to our ſeamen, are alſo unknown to them; and there is no danger of their deſertion, either in peace or war, to the ſervice of foreign ſtates, our rivals and enemies. In ſhort, if the abundance of freſh-water rivers and lakes in a country has never been thought a detriment to its navigation, but the contrary,

there ſeems no reaſon for ſuppoſing artificial inland navigations to be in this reſpect at all more injurious. When the hiſtory of inland navigations, and the ſpirit of induſtry and commerce come to be better underſtood, and popular prejudices decline, theſe objections to canal navigations will be no longer urged.

There are countries, in particular China and Holland, that have ſyſtematically encouraged canals and inland navigations at the public expence, neither of them wanting wealth, population, or employment. France has not been deficient in public undertakings of a ſimilar nature. In England the zeal of individuals has had a public ſanction; but the undertakings have been conducted at their private expence. We build palaces for our public offices, and laviſh immenſe ſums in warlike preparations, more frequently actuated by caprice and paſſion, than guided by our true intereſts; but we do not ſufficiently cultivate thoſe projects which would tend to cheriſh induſtry, to produce wealth, and increaſe real national ſtrength. A time may come when the general ſyſtem of all governments may be directed more to the encouragement of ſuch public undertakings as may promote population and the proſperity of the country, than to the deſpicable intrigues and deſtructive ambition of courts.

A highway, a bridge, or a canal, may in moſt caſes be made and maintained by a ſmall toll upon carriages which make uſe of them; a harbour by a moderate port-duty upon the tonnage of ſhipping which load and unload in it. When the carriages which

paſs

paſs over a highway or a bridge, and the lighters and barges which are uſed upon a navigable canal, pay toll in proportion to their weight or their tonnage, they pay for the maintaining thoſe public works in proportion to the wear and tear which they occaſion. A more equitable way of maintaining ſuch works cannot be found; for the tax or toll, though advanced by the carrier, is finally paid by the conſumer, to whom it is charged in the price of his goods. Canals, roads, and bridges, conſequently muſt be made where there is trade to ſupport them. In ſeveral parts of Europe the toll, or lock-duties on a canal, is the property of ſome private perſon, whoſe intereſt obliges him to keep it in proper repair, if not the navigation ceaſes, and with it his profit; his principal, as well as intereſt, is therefore at ſtake. There is this difference between a high road and a canal; the road, if neglected, and ſuffered to fall to decay, is not entirely impaſſable; whereas a canal is. When a navigable canal has been once made, the management of it becomes quite ſimple and eaſy; and with reſpect to the making, it is reducible to ſtrict rule and method: it may be contracted for with undertakers at ſo much per mile, and ſo much per lock: ſuch undertakings therefore may be, and accordingly frequently are, very ſucceſsfully managed by joint-ſtock companies.

Good roads, canals, and navigable rivers, by diminiſhing the expence of carriage, put the remote parts of the country more upon a level with thoſe in the neighbourhood of large towns; they are, on that account, the greateſt of all improvements. They

encourage

encourage the cultivation of the remote parts, which muſt always be the moſt extenſive circle of the country; and thereby rents are much improved. They are advantageous to towns, by breaking up the monopoly of the country in their neighbourhood; and they are advantageous to all parts of the country; for, though they introduce ſome rival commodities, they open many new markets for their produce.

It is not more than ſixty years ago that ſome of the counties in the neighbourhood of London petitioned parliament againſt the extenſion of the turnpike roads into the remoter counties; becauſe thoſe remoter counties, it was pretended, from the cheapneſs of labour, would be able to ſell their hay and corn cheaper in the London markets than themſelves, and would thereby reduce their rents or ruin their cultivation. Their rents, however, have riſen, and their cultivation has been improved ſince that time.

All canals may be conſidered as ſo many roads of a certain kind, on which one horſe will draw as much as thirty horſes do on the ordinary turnpike roads, or on which one man alone will tranſport as many goods as three men and eighteen horſes uſually do on common roads. The public would be great gainers, were they to lay out upon the making of every mile of a canal twenty times as much as they expend upon making a mile of turnpike road; but a mile of canal may often be made at a leſs expence than the mile of turnpike, conſequently there is a great inducement to multiply the number of canals.

Bad roads, and a difficulty of communication between places remote from each other, occaſion a kind of ſterility in a country, and render moſt things much dearer and ſcarcer than they would otherwiſe be; and a nation placed in the moſt favourable climate, and bleſſed with the moſt fertile ſoil, if it have bad roads, and be without convenient modes of conveyance, will not be ſo rich and affluent as another nation leſs favoured in climate and ſoil, which ſhall have excellent roads and canals, ſuppoſing the genius and induſtry of both nations to be the ſame.

So fully to this point is the following paragraph by a gentleman (Major Rennell), to whom I am under other obligations, wherein alſo the great advantages ariſing from the eaſy communication by inland navigation, and the great diſadvantages attending the want of ſuch intercourſe, are pointed out ſo clearly, and ſo much to my mind, that I am conſtrained to give it my readers. "As both Europe, and its adjacent continent, Aſia, are ſpread over with inland ſeas, lakes, or rivers of the moſt extended inland navigations, ſo as collectively to aid the tranſport of bulky articles of merchandiſe from one extreme of them to the other, and to form (like ſtepping-ſtones over a brook) a more commodious communication; ſo likewiſe the northern part of the new continent appears to have an almoſt continuous inland navigation; which muſt prove of infinite advantage to its inhabitants when fully peopled, and contribute to their ſpeedier civilization in the mean time. But Africa ſtands alone in a geographical view. Penetrated by no inland ſeas, like the Mediterranean, Baltic, or Hudſon's Bay; nor overſpread with extenſive lakes, like thoſe of North

America; nor having, in common with the other continents, rivers running from the centre to the extremities; but, on the contrary, its regions ſeparated from each other by the leaſt practicable of all boundaries, arid deſerts of ſuch extent as to threaten thoſe who traverſe them with the moſt horrible of all deaths, that ariſing from thirſt! Placed in ſuch circumſtances, can we be ſurpriſed either at our ignorance of its interior part, or of the tardy progreſs of civilization in it? Poſſibly the difficulty of conveying merchandiſe to the coaſts, under the above circumſtances, may have given riſe to the *traffic* in *men;* a commodity that can tranſport itſelf."

When the Europeans firſt diſcovered America, the Peruvians, who were to a certain degree a civilized nation, had no other methods of tranſporting goods and heavy materials but on porters ſhoulders, or by the force of men's arms; and it has been ſuppoſed that two thouſand of them have been employed in removing one ſtone. A wide difference from modern times, when the improvements of mechanics in Europe will cauſe the ſame to be moved by five or ſix men, and with as little labour tranſported many miles on a canal. The cities, towns, and villages of Holland have ſuch a free communication with each other by water, that they appear like the ſtreets of the ſame city in reſpect to the convenience of carriage. There is a certain wood in Great Britain which has the advantage of a ſaw-mill, but being ſituated in the midſt of mountains, where there are hardly any roads, it is the work of one horſe to drag away four ſmall deal boards; and

if the diſtance on one ſide exceed twelve miles, they come dearer than if originally brought from Norway.

Bad roads tend not only to render things dearer, but alſo ſcarcer. Before the eſtabliſhment of the poſt-office (which may be compared to an open road of the eaſieſt communication), the carriage of a ſingle letter was not only extremely dear, but very few were written. People might live happily were the number of letters diminiſhed two-thirds; they could not, however, be ſaid to live happily were the quantity of neceſſaries diminiſhed two-thirds. The badneſs of roads lengthens the time of tranſportation of goods; for the ſame waggon that, upon an open and plain road, would be a weekly waggon, upon a rugged and difficult road becomes a monthly one; and the carrier is obliged to quadruple his charge on the conveyance; and a nation in a fertile ſoil, and with numerous inhabitants, is far from being that happy and accommodated people which might be expected.

Were we to make the ſuppoſition of two ſtates, the one having all its cities, towns, and villages upon navigable rivers and canals that have an eaſy communication with each other; the other poſſeſſing only the common conveyance of land-carriage: ſuppoſing, at the ſame time, both ſtates to be equal as to ſoil, climate, and induſtry, commodities and manufactures in the former ſtate might be expected thirty per cent. cheaper than in the latter; or, in other words, the firſt ſtate would be a third richer and more affluent than the ſecond. This, perhaps, is one of the chief cauſes of the

the great wealth of China, which, hiſtorians tell us, is wholly interſected with navigable rivers and canals: but Great Britain and Ireland might ſoon rival China in this laſt particular, and conſequently their people in general might be more rich and affluent.

There is yet one objection to navigable canals (a poor one indeed), viz. that they waſte or take up too great a portion of land in the counties through which they paſs: but I hope it will be a full and cogent anſwer to this objection, that ONE MILE of the duke of Bridgewater's navigation takes up only ONE ACRE AND A HALF of land.

To conclude: the object of the following ſheets is to preſent the reader with a complete, yet conciſe, Hiſtory of Canals, both ancient and modern; but more eſpecially of thoſe completed or projected in England. Of the latter, a large and correct map is given; in which the canals that are completed are coloured *red*; thoſe projected, *brown*; and the rivers, as far as they are navigable, *blue*.

Four other plates are alſo added, which, it is preſumed, will be found uſeful by ſuch as may be engaged in executing undertakings of this kind. Theſe conſiſt of plans, elevations, and ſections for a lock, aqueduct, and bridges.

The author has ſpared no pains in the collection of his materials: he has endeavoured to avail himſelf of every publication relative

relative to his ſubject, from which he has ſelected the information that appeared to him of moſt importance, and which he has been enabled to correct and enlarge, in conſequence of his having been employed in various works of this kind in different parts of the kingdom, and in foreign countries. He is not however ſo vain as to ſuppoſe that he may not have committed ſome miſtakes, notwithſtanding all his attention and care; but the liberal enquirer will remember, that, as this ſpecies of improvement is as yet only in its infancy, the information neceſſary on the ſubject is more difficult to collect, and errors leſs eaſily avoided: he can only ſay, that he has ſpared no labour or attention to detect and rectify them. He has not been ſolicitous to attain to elegance, but he has earneſtly endeavoured to be accurate and perſpicuous: to this praiſe alone he aſpires, and with a modeſt, but, he truſts, a well-founded confidence, ſubmits his performance to the judgment of an impartial, but candid public.

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6° 30 5° 30 4° 30 3° 2° 30

Firth of Forth
EDINBURGH
Firth of Clyde
Forth & Clyde Canal
GLASGOW
Bute I.
CANTIRE
ARRAN I
Irwin
Air
Berwick
Tweed R.
Pt of Durham
Belford
Wooller
Alnwick
NORTH
Rothbury
Bellingham
UMBERLAND
Stamfordham
Halt whistle
Hexham
Tyne R.
Newca
Allendale
Brompton
Longtown
Eden R
Navigable to Carlisle
CARLISLE
Holm
Wigton
Dumfries
Stranraer
Wigtoun
Kircudbright
Maryport
Irehy
Hesketh
Kirk Oswald
Aldstwn
CUMBERLAND
Stanhope
Wolsingham
DURH
Penrith
Workington
Cokermouth
Keswick
Whitehaven
St Bees Head
Egremont
Bp.s Auckland
Bernard Castle
Staindrop
Appleby
Shap
Brough
WESTMORELAND
Ambleside
Orton
Kirkby Stephen
Hawks head
Bowness
Ravenglass
Kendal
Sedbergh
Richmond
Muker
Swale R
Bowtel
Ulverstone
Cartmel
Milthorp
Milton
Burton
Kirkby Lonsdale
Dent
Hawes
Askrig
Middeham
Ure R.
Bedall
Masham
Dalton
Walney I.
Canal
Botton
Halton
Hornby
Batley Bridge
Settle
YORK
Lancaster
Navig. to
Kendal
Galgate
Earl Thanet Castle
Skipton
Thorelb
Carlton
Bradley
Pendle
Ribble R.
Clitheroe
Colne
Keighley
Kildwick
Bingley
Otley
Baildon
Armley
Whalley
Liverpool
Lamshew
Ponel Green
Garstang
Brock Bridge
Natebj
Poulton
Rosake
Kirkham
Trails
Leatown
Preston
Ribchester
Coaster
Altham
Burnley
Bradford
Halifax
Blackburn
Haslingden
Bury
Ecclestone
Hulo
Walton Le Dale
Marton
Lune R.
Ribble R.
Ayre Pt
Ramsey
ISLE
OF
MAN
Laxsey
Peel
Douglas
Sodor
Calf of Man
IRELAND
PART
OF
IRISH
SEA
SCOTLAND

A Map of ENGLAND, Shewing the Lines of all the NAVIGABLE CANALS; with those which have been proposed.

Engraved for the General History of Inland Navigation.

1792.

T. Conder Sculp.t

BRITISH OCEAN

Canals already executed
Dº proposed
Navigable Rivers

Berwick
Holy Id
Staples
Belford
Wooller
Alnwick
Rothbury
Coquet I.
Morpeth
Stamfordham
Newcastle
Tyne R.
Tyne R. Navig.n to Newcastle
Sunderland
DURHAM
Wolsingham
Hartlepool
Sedgefield
Bp.s Auckland
Staindrop
Killerby
Darlington
Stockton
Yarm
Guisborough
Whitby
Richmond
Stocksley
Bedall
Ure R.
Masham
Thirsk
Helmsley
Kirby Moorside
Scarborough
Coxwold
Pickering
Ripon
Easingwold
New Malton
Hunmanby
Batley Bridge
Borough bridge
Bridlington
Flamborough Hd
Knaresboro
Kilham
YORK
Driffield
Wetherby
Pocklington
Otley
Tadcaster
Aberford
Leeds
Weighton
Hornsey
Beverley
Bradford
Sherborn
Cawood
Selby
Howden
S. Cave
Hull
Headon
Pattrington
Wakefield

SEA

Holy Head I.d
Lanerchymead
ANGLESEY
Beaumaris
Great Ormes Hd
Air Pt
Newmarket
Holywell
St Asaph
Caerwis
Flint
FLINT
Aberyday
G. Neston
Frodsham
Knutsford
Northwich
Aytonn
Middlewich
Macclesfield
CHESTER
CHESHIRE
Tideswell
Chapel in the Frith
Peniston
Huddersfield
Rochdale
Bury
Eccleston
Chorley
Marton Lane Ends
Earlton
Snaip
Ormskirk
Vigan
Bolton
Leigh
Manchester
Oldham
Ashton under Line
Stockport
Prescot
Liverpool
Warrington
Mersey
Irwell R.
Duke of Bridgewater's Canal
Altringham
Melling
Mouth Mill
Worsley Mill
Tarporley
Sandbach
Congleton
Longnor
Leek
Winster
Rowton
Nampwich Canal
Acton
Nantwich
Betley
Stapley
Harecastle
Froghall
Norton
Newcastle under Line
Etruria
Cheadle
Caldonlow
Whitchurch
Pt of FLINT SH.
Ellesmere
Drayton
Wem
Hodnet
Stone
Uttoxeter
Abbots Bromley
Burton
Penkridge
Rudgley
Stafford
Newport
Shrewsbury
Severn R.
Wellington
Shiffnall
Brewood
Cannock
LITCHFIELD
FORD SH
Wolverhampton
Walsall
Dudley
Sutton
Coleshill
Birmingham
Stourbridge Coal Works
Stourbridge Canal
Stourbridge
Hales Owen
Church Stretton
Much Wenlock
Bridgnorth
Bishops Castle
Montgomery
Welch Pool
Llanvilling
Dolgelly SH
Dinasmouthwy
MONTGOMERY
Machynleth
Newtown
SH.
Llanidloes
Aberystwith
Cleobury
Ludlow
Bewdley
WORCESTER
Bromsgrove
Droitwich
Leominster
Kington
Pembridge
Weobly
Bromyard
HEREFORD SH
HEREFORD
Knighton
Prestein
Ithyaderony
New Radnor
RADNOR
CARDIGAN
Tregarron
Llanarth SH
Cardigan
Llanpiter
Kilgarren
Newport
Fisgard
PEMBROKE
Bualt
Llanymdo
Harlech
Bala
MERIONETH
Dolgelly SH
Bardsey I.
Aberin
CAERNARVON SH.
Caernarvon
Llaurwst
Denbigh
Ruthin SH
DENBIGH
Rhuabon
Wrexham
Conway R.
Navigable to Llanrwst
Conway Bason
Aber Conway
BANGOR
Newburgh
Trekith
Llanrwst
Ormes Hd
Great Ormes Hd
Air Pt
Beaumaris
Lanerchymead
Holy Head I.d
Harlech
Bala
Ellesmere
Orwestry
SHROPSHIRE
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Hodnet
Oldham
Manchester
Peniston
Ashton under Line
Stockport
Altringham
Knutsford
Chapel in the Frith
Tideswell
Middlewich
Macclesfield
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Aberin
CAERNARVON SH.
Caernarvon
Llaurwst
Denbigh
Ruthin SH
DENBIGH
Rhuabon
Wrexham
Conway R.
Navigable to Llanrwst
Conway Bason
Aber Conway
BANGOR
Newburgh
Trekith
Llanrwst

ST. GEORGE'S CHANNEL

Milford Haven
Navigable to Haverford West & to near Narbarth
Caldys I.
Pembroke
Tenby
Narbarth
Haverford West
Wiston
St Brides Bay
St DAVIDS
PEMBROKE
Fisgard
Newport
Kilgarren
Cardigan
Llanarth SH
Tregarron
Llanpiter
Navigable to Llanpiter
Tivy R.
Newcastle
Caermarthen
Navigable to Caermarthen
Llandillo Tawr
Llangadoc
CAERMARTHEN
Brecon
BRECKNOCK
Llanymdo
Hay
Navigable to Hay
Wye R.
Ledbury
Tewkesbury
Winchcomb
Moreton Marsh
Stow on the Would
Ross
Michael Dean
GLOUCESTER
Newnham
Colford
Blakeney
Painswick
Stroud
Cirencester
Leonard Stanley
Minchen Hampton
Dursley
Berkley
Tetbury
Wooton under Edge
Thornbury
Wickware
Chippin Sodbury
Malmsbury
Castle Comb
Wooton
Basset
Cricklade
Highworth
Swindon
Fairford
Caldecot
Thames & Severn Canal
Severn R.
Chepstow
Caer Rheion
Pont y Poot
Uske
Monmouth
Newport
Caerphilly
Llantrissent
Cardiff
Neath
Swansey Canal
Swansey
Worms H.d
Swansea Bay
Bridgend
LANDAFF
Cowbridge
Nash P.t
Lundy I.
Ilfracomb
Comb Martin
Portlock
Minehead
Dunster
Watchet
Bridgewater
Parrot R.
Glastonbury
Bruton
Somerton
Castle Cary
Langport
Wincaunton
Milbourne Port
Shaftsbury
Stalbridge
Sturminster
Cranbourn
Blandford
Wimbourn
Dulverton
Wivelscomb
Milverton
Taunton
Tone R.
Navig. to Taunton
Wellington
Ilchester
Petherton
Yeovil
Crewkherne
Chard
Ilminster
Shirborn
Eversholt
Beaminster
Cerne Abbots
Frampton
Bridport
Axminster
Lyme Regis
Dorchester
Piddletown
Bere Regis
Warcham
Poole
Abbotsbury
Melcomb Regis
Weymouth
Portland P.t
Corfe Castle
St Albans H.d
Tor Bay
Torbay
Totnes
Brent
Plymouth
Plympton Earle
Modbury
Dartmouth
Dodbrook
Ram H.d
Start P.t
Sound
Lestwithiel
St Germans
W. Looe
E. Looe
Fowey
St Austle
Grampond
Truro
Tregony
St Columb
St Michael
Redruth
St Mawes
Penryn
Falmouth
St Ives
Penzance
Market Jew
Lands End
Helstone
Padstow
Wadebridge
Camel R.
Bodmin
Callington
Liskeard
Saltash
Bere Alston
Ashburton
Newton Abbot
Tavistock
Launces-ton
Lifton
Newport
Boosaste
Bossiney
Camelford
Navigable to Wadebridge
Hatherleigh
Holsworthy
Shipwash
Bude Haven
Stratton
Marham
Whitson
Tamerton
Week
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Hartland P.t
Barnstable
Bideford
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Chumleigh
Tiverton
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BRISTOL CHANNEL

Lundy I.
Ilfracomb
Comb Martin
Portlock
Minehead
Dunster
Watchet
Bridgewater
Parrot R.
Glastonbury
Bruton
Somerton
Castle Cary
Langport
Wincaunton
Milbourne Port
Shaftsbury
Stalbridge
Sturminster
Cranbourn
Blandford
Wimbourn
Dulverton
Wivelscomb
Milverton
Taunton
Tone R.
Navig. to Taunton
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Yeovil
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Weymouth
Portland P.t
Corfe Castle
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Tor Bay
Torbay
Totnes
Brent
Plymouth
Plympton Earle
Modbury
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Sound
Lestwithiel
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HISTORY

OF

INLAND NAVIGATION.

CHAP. I.

Utility of Inland Navigation—Ancient Canals—Canals of Egypt—Account of the great Canal cut through the Iſthmus of Suez, from Diodorus, Herodotus, and Strabo—Deſcription of the Nilometer, or Inſtrument for meaſuring the Inundation of the Nile.

THAT the greateſt advantages are derived to mankind from navigation, which eſtabliſhes an intercourſe between all the different inhabitants of the earth, and enables them to ſupply their mutual wants, by exchanging their various productions, is a poſition which no one will diſpute. To the improvements made in that moſt uſeful art, are the commercial nations of Europe principally indebted for their ſuperiority over the reſt of the world in power and opulence, the conſequence of their extenſive trade, and the flouriſhing ſtate of their manufactures.

But what the ocean is to the diſtant countries it divides, navigable rivers and canals are to the different provinces and diſtricts of the ſame country; and as navigation on the former effects an intercourſe, and mutual exchange of productions, between different kingdoms; in like

manner inland navigation facilitates a communication between, and conſequently promotes trade and induſtry in, the different parts of the ſame kingdom. It ſeems indeed totally unneceſſary at preſent to attempt to enumerate the great benefits which accrue to trade and commerce from inland navigation. There is ſcarcely any civilized people, either ancient or modern, but have borne teſtimony to the utility of canals, by executing works of that kind.

Among the nations of antiquity, Greece, the miſtreſs of the world in arts and ſcience, did not want canals; that country being every where bounded and indented by the Ægean and Ionian ſeas, with their numerous bays, havens, creeks, and rivers: yet hiſtory informs us of many projects and undertakings of canals which were never completed. Demetrius Poliorcetes, Julius Cæſar, and the emperors Caligula and Nero, attempted in vain to cut through the iſthmus by which Peloponneſus is joined to the reſt of Greece, and thus form a communication between the Ionian and Ægean ſeas. We alſo find traces of canals cut to drain off the waters of the lake Copais in Bœotia, of ſuch remote antiquity that all knowledge of the time when they were made has now been loſt for many ages. The following is the account given of them by the ingenious and learned Abbé Barthelemy, in his Travels of Anacharſis the Younger.

" Bœotia may be conſidered as a large baſon ſurrounded by mountains, the different chains of which are connected by high grounds. Other hills ſtretch into the heart of the country: moſt of the rivers which proceed from them unite in lake Copais, which is three hundred and eighty ſtadia (about forty-three Engliſh miles) in circumference, and which neither has nor can have any apparent iſſue; it would, therefore, ſoon overflow Bœotia, had not the induſtry of man contrived ſecret paſſages to drain off the water. In the part adjoining to the ſea, the lake terminates in three bays, which advance to the foot of mount Ptous, ſituated between the ſea and the lake. From the bottom of each of theſe bays

diverge a number of canals, that traverſe the mountain through its whole breadth, ſome of which are thirty ſtadia (or more than three miles) in length, and others a much greater extent. To excavate or cleanſe them, very deep wells had been ſunk, at ſtated diſtances, on the mountain.

"The traveller, when he views theſe works, is aſtoniſhed at the difficulty of the enterpriſe, as well as at the expence it muſt have coſt, and the time requiſite for its completion. But what is ſtill more ſurpriſing is, that theſe canals and pits, of which neither hiſtory nor tradition has preſerved any remembrance, muſt be attributed to the moſt remote antiquity, and that in thoſe diſtant ages we have no knowledge of any power in Bœotia capable of forming and executing ſo vaſt a project."

Rome, more attentive to enſlave the world by conqueſt, than to extend her commerce or improve the arts, affords us no examples of canals for internal navigation; but her magnificent aqueducts, though not ſtrictly within the plan of the preſent work, deſerve to be mentioned. Theſe were conſtructed, at an immenſe expence, for the conveyance of water to that rich and populous city. Some of them were of ſtone, others of brick, and others of wood; ſome conveyed the water under ground, and others above it, ſupported by arches of prodigious ſolidity, beauty, and grandeur; and of the latter ſome are recorded to have extended a hundred miles in length. Frontinus, a man of conſular dignity, who had the direction of the aqueducts, under the emperor Nerva, tells us of nine that emptied themſelves through thirteen thouſand five hundred and ninety-four pipes of one inch diameter; and Vigenere obſerves that Rome received from theſe aqueducts no leſs than five hundred thouſand hogſheads of water in twenty-four hours.

In the year 1789 the canal which was cut by the emperor Claudius to drain the Fucine lake into the river Liris, was begun to be cleanſed, to the great relief of the neighbouring country, which was inundated by its obſtruction.

Egypt, depending entirely on the overflowing of the river Nile for the watering of the country, contained a great number of canals, dug to receive and diſtribute the waters of the river, at the time of the inundation: but the principal work of this kind, in that country, was the grand canal by which a communication was made between the Nile and the Red Sea. This was begun, according to Herodotus, by Necos, the ſon of Pſammetichus, who deſiſted from the attempt on an anſwer from the oracle, after having loſt one hundred and twenty thouſand men in the enterprize.

Diodorus Siculus gives the following account of this canal.

" A canal of communication has been cut, which paſſes from the Gulph of Peluſium into the Red Sea. It was begun by Necos, ſon of Pſammetichus, and continued by Darius, king of Perſia; but at length laid aſide by the advice of ſome perſons, who aſſerted it would lay Egypt under water, becauſe the land was below the level of the Red Sea. Ptolemy the Second, however, finiſhed the undertaking; but conſtructed, in the moſt convenient part of the canal, a dam, or ſluice, ingeniouſly contrived, which opened to give paſſage, and immediately cloſed again: on that account the river, which diſcharges itſelf into the ſea, near the city of Arſinoe, has received the name of Ptolemy's River."

This canal was wide enough for two galleys to paſs abreaſt, and four days ſailing in length; and was far ſuperior, for utility, dimenſions, and trade, to any other canal in the then known world. The wealth of India, Perſia, Arabia, and the kingdoms on the coaſt of Africa, was brought by ſhipping to the Red Sea, and, by this vaſt canal, conveyed to the Nile, whence it was diſtributed by the Mediterranean, not only to Greece and Rome, but to all the ſurrounding nations, until the Portugueſe diſcovered a way to India by the Cape of Good Hope.

This canal after the time of Ptolemy fell into diſuſe, and policy had probably

probably ſome ſhare in the neglect of it; but it was again opened in the year 635, under the Caliph Omar. Elmacin, indeed, ſays that a new canal was then made for the conveyance of the corn of Egypt to Arabia: but this is more naturally to be underſtood of the renewal of the ancient one, the navigation of which, towards the decline of the Roman empire, had been much neglected. The ſame author adds, that it was ſtopped again at the end next the Red Sea, by the Caliph Abugiafor Almanzor, the ſecond of the family of Abbas, in the year of the Hegira 150, anſwering to the year of Chriſt 775. There are ſome traces of it ſtill ſubſiſting. M. Boutier in 1707 diſcovered the end which riſes out of the moſt eaſterly branch of the Nile.

Abulfeda thus deſcribes the beauty of the canal of Faoua: "No proſpect can be more enchanting or agreeable. Gardens, groves, and eternal verdure adorn its banks, which are ſhaded by date trees, covered with vines, and embelliſhed with pleaſure houſes." The above canal was cut from the Nile to Alexandria by Ptolemy, to fill the immenſe ciſterns, which are vaulted with great art, and conſtructed in all parts of that city. The numerous magnificent aqueducts are ſtill almoſt entire, although they are above two thouſand years old: but they are now uſeleſs, as they have been for many ages.

Strabo tells us that the canal between Alexandria and Canopus, in which city was a temple of Serapis, was loaded night and day with boats, which carried religious votaries to the deity: this canal is now dry. Herodotus alſo ſays that the ſtones for the building of the temple of Latona in Egypt, were brought by rafts, down the canals of the river Nile, a diſtance of two hundred leagues. He meaſured one ſingle ſtone, which was ſixty feet ſquare, and ſix feet thick: it was intended for a pedeſtal for a column, fifty feet high, ſix feet diameter, and alſo cut out of a ſingle block of ſtone.

The annual inundation of the Nile is the ſource of the fertility of Egypt.

Egypt. When the water has riſen to a certain height, the Khalig, or grand canal, is opened, by which it is conveyed, by a prodigious number of ſmaller canals, into reſervoirs and ciſterns, to be diſtributed among the fields and gardens as it is wanted. To determine when it has attained to this height, a pillar, called a Nilometer, is erected in an iſland oppoſite Cairo, and divided into picks, a meaſure of about two feet. The following is the account given of it by Baron de Tott.

"The progreſs of the inundation is obſerved at the Nilometer, ſituated at the ſouthern point of the iſland of Rhoda, oppoſite Old Cairo. Public criers, diſtributed in each quarter of the capital, every day make known to the people the riſing of the waters, till they are come to the height proper for opening the canal, by which they are conveyed to the middle of the city, and the ciſterns. But this moment cannot be aſcertained with preciſion, becauſe ſuperſtition prevents the eye of curioſity from approaching the graduated column. Placed in the centre of the baſon of the Nilometer, the cry of *Oof-Allah*, which ſignifies, God has kept his promiſe, proclaims the opening of this canal. Children bearing ſtreamers of different colours accompany the crier, and diffuſe a general joy at the certainty of plenty.

"Sultan Selim, after having conquered Egypt, gave it laws, eſtabliſhed a new form of government, and decreed that this kingdom, now become a province of his vaſt empire, ſhould be only liable to a tribute, when the increaſe of the Nile ſhould be ſufficient for opening the canal; as, in fact, it is only then that the waters ſuffice for the wants of agriculture. This is what takes place every year. But it is not merely this degree of increaſe that yields the greateſt plenty: to produce that the waters muſt reach the foot of the mountains; and then it is that the criers proclaim, *Minel-Dgebel il-Dgebel*, "from one mountain to another."

"The ancient Egyptians had the barbarous cuſtom of ſacrificing a young

young girl to the Nile, when the waters roſe to a ſufficient height for opening this canal. They call her the *Arooſſa* or the Bride; and the name and ceremonies of this ſanguinary feſtival are ſtill preſerved, though the Caliph Omar has rendered it more humane by ſubſtituting a pillar of earth, which repreſents the victim, and is thrown into the Nile. The principal inhabitants of Cairo appear at this ceremony in their gondolas, richly ornamented; and it is always ſucceeded by entertainments and fireworks. A great number of other canals, only taken care of by thoſe who derive advantage from them, iſſue from that arm of the Nile which runs to Damietta, and fertilize the province of Sharkia, which, making part of the Iſthmus of Suez, is the moſt conſiderable of Egypt, and the moſt capable of a great increaſe of cultivation. The plains of Gaza, which lie beyond and are poſſeſſed by the Arabs, would not be leſs fertile, if the ſpirit of devaſtation did not deſtroy even the ſpontaneous productions. A number of other canals run through the iſland of Delta, many of which are navigable; and that of Manoof, or Meneuf, communicates with the two branches of the Nile, ten leagues below the angular point called *the Belly of the Cow*. This canal begins at Nadir, and not at Gueſeid, where D'Anville has placed the mouth of it, and croſſes the province of Manufia, the culture of which may be compared to a well-managed kitchen garden."

"The veſtiges of the canals which watered the provinces weſtward and eaſtward of the Delta, prove them to have been the beſt cultivated of any part of ancient Egypt: we may alſo preſume, from the extent of the ruins of Alexandria, the conſtruction of the canal, and the natural level of the lands which encompaſs the lake Mareotis, and extend themſelves weſtward to the kingdom of Barca, that this country, at preſent given up to the Arabs, and almoſt a deſart, was once ſufficiently rich in productions of every kind to furniſh the city of Alexandria with its whole ſubſiſtence."

CHAP.

CHAP. II.

Canals of China, prodigious Trade carried on by them from the remoteſt Part of the Empire—Account of the Royal Canal, its Length and Trade—No private Property or Plantation, even of the Emperor, allowed to obſtruct the cutting of a Canal—The Emperor, or Governor of a Province in which a new Canal is made, digs the firſt Spade of Earth—No Locks on the Chineſe Canals—The ſtrange Method employed by the Chineſe to raiſe or fall Veſſels out of one Canal into another, where they are not level—Prodigious Numbers of Veſſels employed on theſe Canals for the Emperor only—Carefulneſs of the Chineſe to huſband every Spring of Water—Account of Canals in Hindooſtan.

CHINA.

IN the great empire of China there is ſcarcely a town, or even a village, which has not the advantage either of an arm of the ſea, a navigable river, or a canal, by which means navigation is rendered ſo common, that there are almoſt as many people live on the water as the land.

The Great Canal, which is alſo called the Royal Canal, is one of the wonders of art: it was finiſhed about the year 980; thirty thouſand men of all denominations were employed forty-three years in completing it. It runs from north to ſouth, extending from the city of Canton to the extremity of the empire; and by it all kinds of foreign merchandize, entered at that city, are conveyed directly to Pekin, being a diſtance of 825 miles. Its breadth is about fifty feet, and its depth a fathom and a half,

half, which are ſufficient to carry barks of conſiderable burthen, which are managed by maſt and ſails, as well as by oars; and ſome of a ſmaller ſort are towed by hand. The emperor of China is ſaid to employ ten thouſand ſhips, abating one, for a reaſon very peculiar. This canal paſſes through, or near, forty-one large cities; it has ſeventy-five vaſt ſluices to keep up the water, and paſs the barks and ſhips where the ground will not admit of ſufficient depth of channel, beſides ſeveral thouſands of draw and other bridges. Innumerable canals are cut from this main canal, and the whole empire abounds with rivers, lakes, and rivulets.

China owes the greateſt part of its riches and fertility to theſe numerous canals, which are of the greateſt utility for the tranſportation of the produce and merchandize of one province to another: they are bordered, or faced, with quays of freeſtone, and in low marſhy places very long cauſeways are raiſed for the convenience of travellers. Theſe canals are cut through any kind of private property, gardens, plantations, or pleaſure-grounds; not even the gardens of the emperor, or any of his governors, are exempted: but when the work arrives at the garden or pleaſure-ground, the governor, or even the emperor himſelf, digs the firſt ſpade of earth, and pronounces with an audible voice, "This is to let thoſe of inferior ſituations know, that no private pleaſure ſhall obſtruct the public good." There are bridges over theſe canals, of three, five, ſeven, or more arches, to open a free communication with the country: the middle arch is generally very high, that barks and barges may paſs under it with their maſts ſtanding. When the water is high, and liable to overflow the neighbouring fields, they take care to open the ſluices to convey it away, and to keep it at a certain height in the canal. There are inſpectors appointed to ſurvey the canal and viſit it continually, and workmen always ready to repair the damaged places.

And here permit me to mention one circumſtance, in which it would not be beneath the magiſtrates of this country to imitate the example of the

Chineſe. In the whole of this great empire of China it is an eſtabliſhed maxim, that when a crime of magnitude is committed, the mandarin of the province ſhall be puniſhed, becauſe the law commands him to take care of the morals of the people. As God has given to every country the means of ſubſiſtence, it is a high offence to magiſtracy that men ſhould commit crimes through diſtreſs.

The criminals are obliged to work on the canals for a time, according to their ſeveral offences: they wear a diſgraceful dreſs, and are allowed only a bare ſupport of very ordinary proviſions.

F. Magaillane aſſures us that there is a paſſage by inland navigation from one end of the empire of China to the other, being a ſpace of 600 French leagues, and that a traveller may go this whole diſtance entirely by canals or rivers, except a ſingle day's journey by land, to croſs a mountain; an advantage which this jeſuit, who made the voyage himſelf, obſerves, is not to be found in any other kingdom or ſtate in the univerſe.

The Abbé Groſier obſerves, that it is recorded in the annals of China, that their emperors gave every encouragement to agriculture, and thought it far ſuperior to gold, ſilver, or precious ſtones. One particular deſerves notice. About the year 1500 a merchant had opened a mine of precious ſtones. As ſoon as it was known, the emperor cauſed it to be ſhut, with this obſervation: "Uſeleſs labour cauſes ſterility: a mine of precious ſtones does not produce corn."

For ſeveral of the preceding obſervations on the canals of China I am indebted to Du Halde: the following are extracted from the Journey of Louis le Comte, the Jeſuit, who was above ten years a miſſionary, and travelled through the whole empire of China.

"Although China were not of itſelf," ſays he, "ſo fruitful a country as I have repreſented it, the canals which are cut through it would be

be alone ſufficient to render it ſo: but beſides their great uſefulneſs in watering the country, and promoting trade, they alſo add greatly to its beauty. They generally contain a clear, deep, and running water, that glides ſo ſoftly that it can ſcarcely be perceived. There is commonly one in every province, which is to it inſtead of a road, and runs between two banks, built up with flat coarſe marble ſtones bound together by others which are jointed into them.

"One large canal generally runs through every province, and a vaſt number of ſmaller ones are cut from that large one, which again are ſubdivided into ſtill ſmaller, or rather rivulets, that end at ſome village or great town: ſometimes they diſcharge themſelves into a lake or large pond, from which all the adjacent country is watered; ſo that theſe clear and plentiful ſtreams, embelliſhed by a great number of fine bridges, bounded by neat and convenient banks, equally diſtributed through vaſt plains, covered with a numberleſs multitude of boats and barges, and crowned (if I may uſe the expreſſion) with a prodigious number of towns and cities, whoſe ditches they fill, and whoſe ſtreets they form, at once render that country the moſt fruitful and moſt beautiful in the world.

"Surpriſed, and as it were aſtoniſhed, at ſo noble a ſight, I have ſometimes borne a ſecret envy to China in Europe's behalf, which muſt own that it can boaſt nothing in that kind to be compared to the works of the Chineſe. What would it be then, if that art which in the wildeſt and moſt unlikely places has raiſed magnificent palaces, gardens and groves, had been employed in that rich land to which nature has been laviſh of her moſt precious gifts!

"The Chineſe ſay their country formerly was totally overflowed, and that by dint of labour they drained the water by cutting it a paſſage through theſe uſeful canals. If this be true, I cannot enough admire at once the boldneſs and induſtry of their workmen, who have thus made

great artificial rivers, and from a kind of ſea created the moſt fertile plains in the world.

"It will ſcarcely be believed that men ſo ignorant in the principles of phyſics, and the art of levelling, could bring ſuch works as theſe to perfection; yet it is certain that theſe canals were dug by men, for they are uſually ſtraight, and their diſtribution is equal and orderly. There are flood-gates made for the rivers to let in their water, and others to let it out when they are too full; ſo that it cannot be doubted but that the Chineſe are only indebted to their own induſtry for that great conveniency.

"Among all thoſe canals in the ſouthern provinces, one above the reſt is called the Great Canal, becauſe it traverſes the whole country from Canton, which lies on the ſouthern ſide, to Pekin, ſituated in the moſt northerly part of the empire. We need only travel a ſhort day's journey by land to croſs the mountain, called Moilin, which on one ſide bounds the province of Kiamſi. Two rivers riſe in this mountain, one of which runs ſouthwards to the ſea, and the other northwards as far as the river of Nankim, whence by the yellow river and ſeveral canals we may proceed by water to the very mountains of Tartary.

"But ſince, in this vaſt extent of ground of above four hundred leagues in length, the earth is not level, or hath not a deſcent proportionable to the emanation of the waters, it was neceſſary to conſtruct a great number of ſluices. They are called by the name of ſluices in the relations of travellers, notwithſtanding they are very different from ours; they are rather water-falls, and as it were torrents that are precipitated from one canal into another, and more or leſs rapid, according to the difference of their level. To cauſe barks or barges to aſcend, they make uſe of a great company of men, who are maintained for that purpoſe near the ſluice: after they have drawn cables and ropes to the right and left, to lay hold of the bark in ſuch a manner that it cannot

eſcape

eſcape them, and every cable and rope is made tight, they have ſeveral capſtans, by the help of which they raiſe it by little and little by exerting the utmoſt ſtrength of their arms, and employing levers, till they have raiſed it into the upper canal, in which it may continue its voyage. This labour is tedious, toilſome, and exceedingly dangerous. They would be wonderfully ſurpriſed could they behold with what eaſe and facility one man alone, who opens and ſhuts the gates of our locks and ſluices in Europe, makes the longeſt and heavieſt laden barks and barges ſecurely to aſcend and deſcend.

"I have obſerved in ſome places in China, where the waters of two canals have no communication together; yet for all that they make the boats to paſs from one to the other, notwithſtanding the level may be different above fifteen feet: to effect which they proceed in this manner: at the end of the canal they have built a double glacis, or ſloping bank of freeſtone, which uniting at the point extends itſelf on both ſides up to the ſurface of the water. When the bark is in the lower canal, they hoiſt it up, by the help of capſtans, to the plane of the firſt glacis, ſo far, till being raiſed to the point, it falls back again by its own weight along the ſecond glacis (I ſuppoſe, inſtead of falling back again, that it falls forwards) into the water of the upper canal, where it ſkuds away to a conſiderable diſtance, like an arrow out of a bow; and they make it deſcend after the ſame manner proportionably. I cannot imagine how theſe barks, being commonly very long and heavy laden, eſcape being ſplit in the middle, or having their backs broken, when they are poiſed in the air upon this acute angle; for, conſidering the length, the lever muſt certainly have a ſtrange effect upon it: yet do I not hear that any accidents happen in conſequence of it. I have paſſed that way ſeveral times; and all the precaution they take when they do not chooſe to go on ſhore during the operation, is to tie themſelves faſt to ſome cable, or rope, for fear of being toſſed from prow to poop (it ſhould be from ſtern to ſtem, or from poop to prow).

"We

"We meet with no ſuch ſluices in the Grand Canal, becauſe the emperor's barks, that are as large as our frigates, could not be raiſed by force of arm, nay would infallibly be ſplit in the fall. All the difficulty conſiſts in ſurmounting theſe torrents of which I have ſpoken: yet this is what they perform ſucceſsfully, though not without ſome trouble and expence.

"Theſe water paſſages, as they call them, are neceſſary for the tranſportation of grain and ſtuffs, which they fetch from the ſouthern provinces, and carry to Pekin. There are, if we may give credit to the Chineſe, a thouſand barks, from eighty to an hundred tons, that make a voyage once a year, all of them freighted for the emperor, without reckoning thoſe of particular perſons, which are innumerable. When theſe prodigious fleets ſet out, one would imagine they carry the tribute of all the kingdoms of the eaſt, and that one of thoſe voyages alone was capable of ſupplying all Tartary with a ſufficiency for its ſubſiſtence for ſeveral years. But Pekin alone receives the benefit of it; and this would be ſcarcely any, did not the province contribute beſides to the maintenance of the inhabitants of that vaſt city, the circumference of which is ſix great leagues, allowing thirty-ſix hundred paces to a league, and contains at leaſt two millions of people; and it has been judged to contain not leſs than ſix millions of ſouls, and that the two millions are only men, without reckoning women and children: but the exact number is very difficult, if at all, to be aſcertained.

"The Chineſe not only make canals for the convenience of travellers, but they alſo dig many others, to catch the rain water which comes down from the mountains, and with which they water the fields in time of drought, more eſpecially in the northern provinces. During the whole ſummer, you may ſee the country people buſied in raiſing this water into abundance of ſmall ditches or channels, which they cut acroſs the fields. In other places they contrive great reſervoirs of turf, the bottom

of which is raiſed above the level of the ground about it, to ſerve them in caſes of neceſſity: beſides, they have every where in the provinces of Xenſi and Xanſi, for want of rain, certain pits from twenty to a hundred feet deep, from which they draw water with incredible labour. If by chance they meet with a ſpring of water, it is worth obſerving how carefully they huſband it; they ſuſtain it by banks in the higheſt places; they turn it here and there an hundred different ways, that all the country may reap the benefit of it; they divide it by drawing it by degrees, according as every one hath occaſion for it; inſomuch that a ſmall rivulet, well managed, ſometimes diſpenſes fertility to a whole province."

To the above accounts of the canals of China I ſhall now add ſome deſcription of thoſe in other parts of Aſia, which, I doubt not, will be highly acceptable to the curious enquirer on this ſubject, as it tends to ſhew the ſkill and intelligence of the natives of that quarter of the globe, their ideas of the advantages of inland commerce, and with what indefatigable induſtry they have laboured to promote it. The following account of the canals and inland navigation of Hindooſtan, or the Mogul empire, more commonly known by the name of Bengal, is extracted from Mr. Rennel's Memoirs of Hindooſtan, publiſhed in 1788.

"The countries between Delhi and the Panzab being ſcantily ſupplied with water, the emperor Feroſe III. undertook the noble as well as uſeful taſk of ſupplying it better, and at the ſame time meant to apply the water ſo furniſhed to the purpoſes of navigation. Dow (vol. i. p. 327) tranſlates Feriſhta thus:

'In the year 1355, Feroſe marched to Debalpour, where he made a canal one hundred miles in length, from the river Suttuluz to the river Iidger. In the following year between the hills Mendouli and Sirmore, he cut a canal from the river Jumma, which he divided into ſeven ſtreams, one of which he brought to Haſſi, and from thence to Beraiſen, where he built a ſtrong caſtle, calling it by his own name. He drew ſoon after a canal

a canal from the river Caggar, paſſing by the walls of Sirſutti, and joined it to the river of Kera, upon which he built a city, named after him, Feroſeabad. This city he watered with another canal from the river Jumma. Theſe public works were of prodigious advantage to the adjacent countries, by ſupplying them with water for their lands, and with a commodious water-carriage from place to place.'

"We learn alſo from the Ayin-Acbaree (vol. ii. p. 107, Engliſh tranſlation), that Feroſe founded the city of Hiſſar, called alſo Hiſſar-Feroozeh, and dug a canal from the Jumma to it; and we find moreover that the canal from the Jumma at Kungiparah to Delhi, was the work of Feroſe, and is probably one of the ſeven canals mentioned by Feriſhta. I apprehend, then, that Hiſſar, or Hiſſar-Feroozeh, of the Ayin-Acbaree, is the ſame with the Feroſeabad of Feriſhta. But poſſibly Feroſe might only embelliſh and increaſe the fortifications of Hiſſar, and then give his name to it, a practice very common in Hindooſtan, to the utter confuſion of hiſtoric records, and with no leſs injuſtice to the original founders. The town of Surſutti, by the authority of MS. maps and other circumſtances, I place on the river of that name, between Tannaſar and Kythil (or Kuteil), and Haſſi or Hanſi, on the weſt or ſouth-weſt of Kythil. Hiſſar, or Feroſeabad, will occupy a place ſtill farther to the ſouth-weſt, and in this poſition will be about ſeventy-five coſſes from Delhi, in a weſt or north-weſterly direction, and about one hundred miles from Setlege or Suttuluz, at the neareſt part of Debalpour, from whence the canal was ſaid to be drawn. The rivulet of Kerah I cannot trace any more than the Iidger; but I think it will appear as clear to the reader as to myſelf, when the text and the different poſitions in the map are conſidered (the laſt complete one of Hindooſtan publiſhed I ſuppoſe him to have now before him), that theſe different canals had for their immediate object the junction of the Setlege and Jumma rivers, and remotely that of the Indus and Ganges; although they do not allow us to comprehend the whole ſcope of Feroſe's plan of inland navigation. By a ſlight inſpection of the map it will appear that this project would, if the ground be admitted

mitted of its being ſucceſsfully put into execution, be one of the greateſt undertakings of the kind that ever was projected, that of cutting through the iſthmus of Suez only excepted. We ſhould then have ſeen two capital rivers, which traverſe a large part of the continent of Aſia, which enter the ſea at one thouſand five hundred miles aſunder, and which ſtretch out their arms, as it were, to meet each other, united by art (canals), ſo as to form an uninterrupted inland navigation from Cabul to Aſſam. I take it for granted that this canal was never completed, otherwiſe we ſhould have heard more of it, as we have of the canals before deſcribed, leading from the river Jumma. The diſtance between the navigable parts of the Jumma and the Setlege, is not above one hundred and twenty miles direct.

The Ganges and Burrampooter rivers, together with their numerous branches, interſect the country of Bengal (which, independent of Bahar and Oriſſa, is larger than Great Britain) in ſuch a variety of directions, as to form the moſt complete and eaſy inland navigation that can be conceived. So equally and admirably diffuſed are thoſe natural canals, that little is left for art to perform in a country that approaches ſo nearly to a perfect plane, that, after excepting the lands contiguous to Burdwan, Birboom, &c, &c. which may be reckoned about a ſixth part of Bengal, we may ſafely affirm that every other part of the country has, even in the dry ſeaſon, ſome navigable ſtream within twenty-five miles at fartheſt, and more commonly within a third part of that diſtance.

It is ſuppoſed that this inland navigation gives conſtant employment to thirty thouſand boatmen; nor will this excite our ſurpriſe, when it is known that all the ſalt, and a large proportion of the food, conſumed by TEN MILLIONS of people, are conveyed by water within the kingdom of Bengal and its dependencies. To theſe muſt be added, the tranſport of the commercial exports and imports, probably to the amount of two millions ſterling per annum; the interchange of manufactures and products

throughout the whole country; the fiſheries, and the article of travelling. The veſſels made uſe of vary in bulk from one hundred and eighty tons down to the ſize of a wherry. Thoſe from thirty to fifty tons are reckoned the moſt eligible for tranſporting merchandiſe.

The rivers are in a tranquil ſtate from the time of the change of the monſoon in October to the middle of March, when the north-weſters begin in the eaſtern part of Bengal; and theſe winds are the moſt formidable enemies that are met with in this inland navigation; they are ſudden and violent ſqualls of wind and rain, and, although of no long duration, are often attended with fatal effects, if not carefully guarded againſt: whole fleets of trading-boats have been ſunk by them.

During the long interval between the end of the rainy ſeaſon and the beginning of the north-weſters, the navigator is ſecure with reſpect to weather, and has only to obſerve a common degree of attention in piloting the boat clear of ſhallows and ſtumps of trees; the rate of motion muſt principally determine that of the boat, for the motion acquired by the oars of a large budgerow * hardly exceeds eight miles a day at ordinary times. From the beginning of November to the latter end of May, the uſual rate of going with the ſtream is forty miles in twelve hours, and during the reſt of the year from fifty to ſeventy miles. The country, as I obſerved before, is nearly a plane; to prove which, a ſection of the ground parallel to one of its branches, in length ſixty miles, was taken, and found to have only nine inches deſcent in a mile; but the windings of the river were ſo

* A budgerow is a travelling boat, which is uſed in theſe inland navigations, conſtructed ſomewhat like a pleaſure barge: ſome of them have cabins, fourteen feet wide and proportionably long, and which are fitted up genteelly, according to the company they carry and price of carriage: theſe boats draw from four to five feet water.

great

great as to reduce the declivity, on which the water ran, to leſs than four inches per mile.

The medium rate of motion of the Ganges is leſs than three miles an hour in the dry months. In the wet ſeaſon, and during the draining the waters from the inundated lands, the current runs from five to ſix miles an hour; but there are inſtances of its running ſeven and eight miles an hour.

CHAP. III.

Canals of Ruſſia—The firſt begun by Colonel Breckell, a German, who failed in the Attempt, and fled the Country—Captain Perry employed by the Czar, Peter the Great—Three different Surveys of Captain Perry—Account of the celebrated Canal and Locks of Viſhnei-Voloſhok—Navigation up the Twertza to Viſhnei-Voloſhok—Navigation from the Caſpian Sea to the Baltic—Prodigious Number of Veſſels employed in this Inland Navigation—Courſe of the Inland Navigation from Kiatka, the Frontier Town of Ruſſia, next to China, to Moſcow, and Peterſburg—Great Extent of this Navigation—Trade carried on by it between China and Ruſſia.

PETER the Great, czar of Muſcovy, having obſerved, while in Holland, that the induſtrious inhabitants of that country had, by diligent perſeverance, and principally by the means of canals, raiſed a ſmall tract of marſhy land into a populous and powerful ſtate, this great prince, among his other grand deſigns, formed the plan of an inland navigation for conveying the rich commodities of Perſia to his new city of Peterſburg. They were firſt to be tranſported by the Caſpian ſea to Aſtracan; and thence, through the mouth of the river Wolga, and by a conjunction of canals, into the river Meſta, and the lake Novogorod; and thence into the lake Ladoga, and by the river Neva to Peterſburg; being a courſe of four hundred and ſixty miles. He likewiſe projected a communication between the rivers Don and Wolga, which were to join the river Occa by another canal, and thus effect a navigation to Moſcow by the river Moſca; and afterwards, by ſeveral other canals of communication, through the river Dwina, to the city of Archangel on the White ſea. And laſtly, the productions and

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commodities from Archangel and the adjacent countries were to be conveyed through the river Onega to lake Onega by a canal; and alſo through lake Ladoga, which lies at the foot of the gulf of Finland, by the river Neva, to Peterſburg. But the death of this great monarch prevented the perfect completion of this noble undertaking, which would perhaps have rendered Peterſburg the moſt populous city, and beſt place of traffic in the world.

In the year 1698 this work was begun by one colonel Breckell, a German, who was a colonel in the czar's army, and who had the reputation of a good engineer as to fortifications, but very little underſtood the buſineſs of making canals. The firſt ſluice he made was blown up, the water taking its courſe under the foundations on the approach of the firſt flood, and before it was well completed, at the firſt ſhutting the gates; in conſequence of which Breckell, when he went to Moſcow the following winter, obtained a paſs, as for one of his ſervants, whom he pretended he muſt ſend for neceſſaries for the work, and with the ſaid paſs made his eſcape out of the country.

During this firſt year he had twelve thouſand men under his command, employed in digging, cutting down timbers, &c. &c. whoſe time and labour were all loſt in one night.

This year the czar of Muſcovy was in England (on his tour of Europe), and by the recommendation of the Marquis of Caermarthen and Mr. Dummer, then ſurveyor of the navy, engaged and employed captain John Perry as a perſon every way qualified to ſerve his majeſty, as well in his deſigns of eſtabliſhing a fleet, as making his rivers navigable, where not ſo by nature, and cutting artificial canals to join them, to effect an inland navigation through a great part of the country. Captain Perry was engaged at a ſalary of three hundred pounds ſterling a year, and twenty-five roubles * per month ſubſiſtence money, with

* A rouble is four ſhillings Engliſh, ſometimes four ſhillings and ſix-pence.

all

all travelling charges, beſides the promiſe of a handſome reward at the concluſion of any work when finiſhed.

Captain Perry was immediately ſent to Moſcow, with orders, that on his arrival there he ſhould be directly forwarded to the province of Aſtracan, a thouſand werſts or Ruſſian miles (a werſt, or wurſt, is about three quarters of an Engliſh mile) beyond Moſcow, to ſurvey the work which colonel Breckell had begun; and on his arrival there he found the work blown up, and colonel Breckell gone, as has been before related.

Upon this work captain Perry was employed three ſummers ſucceſſively, with orders to have thirty thouſand men to work; but he ſeldom had above half that number; and the laſt year not ten thouſand men, nor the neceſſary artificers, or materials ſufficiently provided; for the governor of Aſtracan, and all the principal boyars, or nobility of that country, obſtinately oppoſed the undertaking, declaring it a thing impoſſible to be effected by the hands of men. The governor repreſented it as burthenſome to the country, from the great numbers of men employed in it, and uſed all his endeavours to cauſe it to be abandoned as impracticable; ſaying, that God had made the rivers to go one way, and it was preſumption in man to think to turn them another.

The czar having been defeated by the Swedes at the battle of Narva, in the latter end of the year 1701, captain Perry received orders to meet the emperor at Moſcow, and to let all the works ſtand ſtill; leaving one of his aſſiſtants there to take care of what was done, ſome of the ſluices being finiſhed, others nearly ſo, and the canal half dug.

In the year 1702 captain Perry was ſent to Veronize, a city ſituated on a river of the ſame name, which falls into the Don, to fix on a place near the mouth of that large river, to lay the czar's navy upon

blocks on dry land to repair, by damming up the river, &c.; which navy was to act againſt the Turks; and here we will leave captain Perry till the year 1707 or 1708, building and repairing ſhips of war (one of which was of eighty guns), making a dock-yard, ſheds for the ſhips to lie dry, warehouſes, ſtorehouſes, &c. &c.

The czar having, at this time, formed the great deſign of building a new city at the mouth of the river Neva, which runs out of lake Ladoga into the Baltic ſea, captain Perry was again called from ſhip-building, and ordered to attempt three ſeveral ways to cut canals from the great river Wolga, and other rivers, to bring timber, proviſions, &c. from the interior parts of the country to the new city Peterſburg.

Captain Perry therefore departed, with aſſiſtants, from the ſide of lake Ladoga to the river Wolga, to trace the ſeveral rivers as they fall into each other, to the places where, at the heads, or firſt ſprings from whence they take their riſe, they approach neareſt, and a communication may be moſt eaſily effected. He accordingly took the deſcent or difference of level of the ſaid ſeveral rivers, as they fall down into the Wolga on the one ſide of the country, and diſcharge themſelves into lake Ladoga on the other, with ſuch obſervations as were neceſſary to be made; and returned, at the end of the year 1710, to give an account of what he had done to his majeſty, who was then at his new city of Peterſburg; and to lay before him the draughts, levels, riſes, and falls, and a report of the propereſt place, the time required, and the expences neceſſary for making ſuch communications, by the way of the river Koefſha, lake Beila, and the river Shackſna, on the one ſide of the country, falling into the Wolga near the town of Rebna; and by the way of the river Whitigor, lake Onega, and the river Swire, falling into the lake Ladoga on the other ſide of the country; where it was neceſſary only to conſtruct twenty-two locks or ſluices, and to cut an eaſy canal not three Engliſh miles in length. A draught of this intended communication, with an eſtimate of the time and expence which would

would be neceſſary for its completion, he preſented to the czar, who received them very graciouſly.

The following ſhort abſtract of the ſurvey will probably not be unacceptable to the curious reader:

The firſt ſurvey of the country was by the way of the rivers Saſs and Tiffin, to the top of the high land within the country, whence an arm of the river Tiffin takes its firſt riſe. He found the ſame the whole way, with abundance of falls, deſcending into the lake Ladoga through a diſtance of one hundred and ſeventy-four Ruſſian werſts, winding as the rivers take their courſe, to be difference of level eight hundred and ninety-ſeven Engliſh feet; and from the top of the ſaid high land in running on the other ſide of the country, four hundred and twenty miles, down the rivers Chacodoſhea and Molloga, to the place where the river Shackſna falls into the Wolga, the deſcent was found to be five hundred and ſixty-two feet.

The ſecond route captain Perry took was by the way of the river Emſta and lake Elmena, and the river Volkoff falling into lake Ladoga: in running a courſe of five hundred and fifty werſts, the deſcent was found to be five hundred and ſixty-eight feet; and on the other ſide of the country, ſouthward, deſcending by the way of the rivers Twere and Wolga, as far as the mouth of the river Shackſna, aforeſaid, in running ſeven hundred and twenty werſts, the deſcent was found to be two hundred and thirty-three feet.

The third route of the aforeſaid engineer was by the way of the river Whitigor, lake Onega, and the river Swire, falling into lake Ladoga; and in the running of two hundred and ſeventy-eight werſts, the deſcent was found to be but four hundred and forty-five feet from the top of the higheſt land, where the rivers come neareſt for a canal to be cut; and the deſcent down on the other ſide of the country, in running four hundred

hundred and eighteen werſts by the way of the rivers Keoſſha, lake Beila, and Shackſna, falling into the Wolga at the ſame place before mentioned only one hundred and ten feet.

This being the loweſt or moſt level part of the country, attended with the leaſt falls, and requiring the leaſt number of locks to be made, and the rivers Swire and Shackſna, and a great part of the rivers Koeſſha and Whitigor, being already navigable for ſmall veſſels which paſs the whole year backwards and forwards, except only when the rivers are frozen; Captain Perry there recommended the laſt ſurvey to his Czariſh Majeſty as abundantly preferable for making the intended communication and canals *.

What was left undone by Peter the Great has been carrying on and completing, with the utmoſt aſſiduity, by his ſucceſſors; and a communication is now effected between the Baltic, or rather the Ocean, and the Caſpian ſea, by which a navigation is opened to Perſia: a new communication with the river Wolga is likewiſe undertaken, the old one being found ſo dangerous as to be almoſt uſeleſs.

Several other works of this kind are carrying on, for the benefit of trade and commerce, by order of the preſent empreſs, in different parts of her extenſive dominions; and the moſt experienced and able engineers have been engaged from every country in the world; which will not fail to render Peterſburg, what Peter the Great intended it ſhould be, the emporium of the North, if not of Europe.

A ſhort ſketch of the works carried on in Ruſſia for the improvement of inland navigation, ſince the death of Peter the Great, ſome of which, as I have before obſerved, were begun by him, and perfected by his great ſucceſſors, will ſhew the attention there paid to the internal commerce of that vaſt country: and when we conſider the great labour

* See Perry's State of Ruſſia.

and prodigious ſums of money thoſe canals muſt have coſt, we ſhall be aſtoniſhed that they ever were completed, ſince Ruſſia has been almoſt continually engaged in expenſive wars ſince they were firſt undertaken.

There is perhaps no part of the world where inland navigation is carried through ſuch an extent of country as in Ruſſia, it being poſſible in that empire to convey goods by water *four thouſand four hundred and ſeventy-two miles*, from the frontiers of China to Peterſburg, with an interruption of only about ſixty miles; and from Aſtracan to the ſame capital, through a ſpace of *one thouſand four hundred and thirty-four miles*; a moſt aſtoniſhing tract of inland navigation, almoſt equal to one fourth of the circumference of the earth.

The communication by water between Aſtracan and Peterſburg, or between the Caſpian ſea and the Baltic, is formed by means of the celebrated canal of Viſhnei-Voloſhok. This great work, which was begun and completed under the reign of Peter the Great, has been ſo conſiderably improved by order of the preſent empreſs (1780), that veſſels now reach Peterſburg in leſs than half the time they formerly employed.

By examining the map of Ruſſia, we find that the Twertza joins the Wolga at Iver; that the Shlina forms the lake Maſtino, which gives riſe to the Maſta; that the latter falls, after a courſe of about two hundred and thirty-four miles, into the lake Ilmen, from which iſſues the river Volkof, which runs one hundred and thirty miles to the lake Ladoga, which ſupplies the Neva; ſo that in effect the Shlina, the Maſta, the Volkof, and the Neva, may be conſidered as the ſame river flowing into and through different lakes, and only changing its name at various intervals. By uniting therefore the Shlina, which communicates with the Baltic, with the Twertza, which flows by the Wolga into the Caſpian ſea, is formed the junction of thoſe two ſeas. This

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junction is made by the canal of Viſhnei-Voloſhok, where the Shlina is united to the Twertza by the following canals and rivulets.

Cloſe to Viſhnei-Voloſhok, the Shlina is formed by the confluence of the two rivulets Shlina and Zna; near the latter are the ſources of the Twertza. In order to join the Twertza with the Zna, the following works were made under the reign of the czar Peter the Great.

Near the village of Klutſhina a canal was dug to the ſmall lake of the ſame name, a ſecond canal was dug to the lake of Gorodolub, and a third canal was dug from thence to the Zna. At the ſame village, juſt below the firſt canal, a lock of four gates was conſtructed acroſs the Shlina, in order to ſtop the courſe of that rivulet, and, by means of the ſaid canals and lakes, to convey water to the Zna above Viſhnei-Voloſhok. But to keep this ſupply of water in reſerve, and to let as much into the town as is judged neceſſary, a great lock of ſeven gates was conſtructed acroſs the Zna, below the third canal. The Zna and the Twertza were united by a canal, beginning from the ſources of the latter, and at the end of the canal a lock was made. The natural courſe of the Zna was ſhut up by two locks in the town, one of which may alſo ſerve for a paſſage. A canal was dug from the Zna to the Shlina, at the end of which is the lock of Zna.

The ſeveral canals are ſupplied with water, and the veſſels are navigated from the Twertza into the canal of the Zna, by the following operation of locks.

The locks of Klutſhina, and thoſe in the town of Viſhnei-Voloſhok, and that of the Zna being ſhut, the lock of the Twertza is opened; the waters of the Zna and Shlina are conveyed through the canal of the Twertza into that river; and the barks and barges paſs into the Zna at Viſhnei-Voloſhok. When a ſufficient number have been admitted, the lock of the Twertza is ſhut, and the waters being raiſed to

a certain level, which it ſeldom takes more than two or three days to effect, by means of the lock of ſeven gates, that of the Zna is opened, and the veſſels are gradually let down a ſmall fall, to the number of about twenty in an hour. At night the lock is ſhut. If on the following day there is ſufficient depth, the veſſels keep deſcending through the lock of the Zna; or, if not, they muſt remain for a day or two until there is a ſufficient body of water collected. Having by theſe means all paſſed into the Shlina, they proceed without interruption through the lake Maſtino to the beginning of the Maſta, where a lock has been lately conſtructed which holds the waters of this lake in reſerve. By this reſervoir the navigation is ſo greatly facilitated, that the lock of the Zna being ſhut, and that of the Twertza open, the latter river, which was formerly almoſt dry during ſeveral weeks, is now generally navigable, even in the midſt of ſummer, within two days after the paſſage of the veſſels: in ſpring the ſupply of water from the melting of the ſnows is ſo very conſiderable, that the locks, both of the Twertza and of the Zna, are open at the ſame time.

With reſpect to the navigation of the Maſta, ſeveral rivulets falling into it are confined by locks, which being opened ſucceſſively as the veſſels are paſſing, fill the river, and render the ſhallows navigable; and, being again cloſed, hold perpetual reſervoirs of water for the ſame purpoſe: this operation is performed five or ſix times in the ſummer. By ſome other works lately conſtructed, a conſiderable addition of water has been obtained; and it is expected that the Twertza will become always navigable, and that the lock of the Maſta will only be ſhut for a ſhort time.

The boats employed on this occaſion are towed by ten horſes, at the rate of ten or twelve miles a day, up the Twertza to Viſhnei-Voloſhok, from which place they are rowed as far as Novogorod. Each veſſel is provided with at leaſt ten men; thoſe which are laden with hemp require twenty-two men. At Noſhino and Baſſatino they change pilots,

pilots, and take in ten additional men to paſs the upper and ſmall cataracts. At Apezenſkoi-Radok, which ſtands at the head of the great cataracts, they procure another pilot and two aſſiſtants, and, on account of the rapidity of the current, increaſe their compliment generally to ſixty men. The fall of the river is one hundred and twenty-two yards and a half perpendicular in twenty miles, and the ſtream is ſo violent, that the veſſels not unfrequently ſhoot along this ſpace within the hour; but they are ſometimes daſhed againſt the rocks, or overſet by accident. In the year 1778, above thirty veſſels were loſt.

From the foot of the great cataracts the pilot of Viſhnei-Voloſhok ſteers the veſſel one hundred and twenty miles further down ſeveral ſhoals, which, however, have been conſiderably reduced, and almoſt levelled. In ſpring the veſſels may be allowed to draw two feet and a half water, in ſummer only twenty-ſix inches. In autumn the navigation from Viſhnei-Voloſhok to Peterſburg is performed in little more than a month, in the ſummer in three weeks, and in ſpring only a fortnight is required. In the year 1777 three thouſand four hundred and eighty-five veſſels paſſed through the canal: this alone ſhews the amazing internal trade of Ruſſia, and from one quarter of the country only. The veſſels being ſteered down the Maſta, acroſs the lake Ilmen to Novogorod, deſcend the river Volkof; and the Ladoga canal, which does not enter the lake Ladoga, but paſſes up from near the mouth of the river Volkof, and winds its courſe on the borders of lake Ladoga to the river Neva, which it enters near the village of Schluſſelburg, and then proceeds to Peterſburg.

This canal was begun in 1718 by order of Peter the Great, and was finiſhed during the reign of the empreſs Anne: it was carried at firſt only as far as the ſmall village of Kabona, to a rivulet of the ſame name, which falls into the lake to the eaſt of Schluſſelburg, but now reaches without interruption from the Volkof to the Neva. Its length is ſixty-ſeven miles and a half, and its breadth ſeventy feet; its mean depth

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of water in ſummer is ſeven, and in ſpring ten feet; it is ſupplied by the Volkof and eight rivulets; the latter being received into reſervoirs, are admitted into the canal by means of flood-gates; and the ſuperfluous water is diſcharged through an equal number of openings on the oppoſite ſide. The veſſels enter through the locks and ſluices of the river Volkof, and go out through thoſe of Schluſſelburg. In 1778, four thouſand nine hundred and twenty-ſeven veſſels paſſed through the canal of lake Ladoga; an increaſe of inland commerce of almoſt one fourth in one year by means of canal navigation.

A ſcheme has been lately projected to form a canal, ſo as to effect a communication between lake Ladoga and Bielo-Ozero to the Duna, in order to unite the White ſea and the Baltic, and to improve the inland commerce of another part of the country, viz. that between Archangel and Peterſburg. The only part of this plan yet finiſhed, is a ſhort cut of about ſeven miles from the Volkof to the Sejas.

The grand project of uniting the Caſpian ſea and the Baltic with the Black ſea, by the junction of the river Don with the river Wolga, was planned by Peter the Great. Theſe two rivers approach each other within the diſtance of forty miles in the province of Aſtracan; and the two rivulets Ilofla and Camaſhinſka, the former of which falls into the Don, and the latter into the Wolga, are only ſeparated by an interval of land of about five miles. Could theſe two rivulets be made navigable, and united by a canal, the Black ſea would be joined with the Caſpian ſea and the Baltic. With this view Peter the Great ſent captain Perry, an Engliſh engineer, as I before obſerved, to the ſpot: the canal was begun under his inſpection, and a cut was actually made a mile and a half; but the ſcheme was dropped then for reaſons before given. It has been revived, however, by the preſent empreſs, and profeſſor Lovitz was intruſted with the execution of it. Having taken a level of the ground between the river Ilofla and the river Camaſhinſka, he traced out the canal, and was preparing to begin the work, when in

1774 he was wantonly murdered by the impoſtor Pugatſchef. According to the plan of Lovitz, the direct diſtance between the two rivulets is only five miles: but the great difficulty would conſiſt in deepening their beds, and procuring a ſupply of water ſufficient to make them navigable. As the Don, however, is only forty miles from the Wolga, and land carriage in this country extremely cheap and eaſy, it is imagined that the advantages reſulting from the projected canal would be ſcarcely equivalent to the expence of making it.

I ſhall here add a ſhort account of the frontier places of commerce between the Ruſſians and Chineſe, the commodities in which they traffic, and the route of the Ruſſian Inland Navigation.

At a great diſtance up the river Yeniſoy, which empties itſelf into the Frozen ocean, or ſea of Kara, beyond Nova Zembla, near a town called Yeniſeik, a large branch takes an immenſe ſweep to the north-eaſt. This branch is called Zunguſka river; and after running full ten degrees in that direction, turns nearly due ſouth. Out of it fork ſeveral rivers, called the Ilim, Irja, Oka, and Angara, which laſt is the principal, and forms a very large body of water, not leſs than eight degrees in length and two in breadth, called the lake of Braikel, in which are a great number of iſlands, ſome of them very large. From nearly the middle of the lake lengthwiſe, another large river goes off ſtill farther ſouth, on the firſt branch of which ſtands the town Udinſk; and on the ſecond branch the town Selinginſk, which is the chief town of the frontier government of Ruſſia. The next branch is called the Kiatkar, and on the fork of this river is the Ruſſian town Kiatka; and on the oppoſite ſide of the river, the Chineſe frontier town Maitmatſchin, which is their commercial town at the extremity of the Chineſe frontiers next to Ruſſia. At this place the rivers Tchikoi, Bura, Tola, Orchon, and Selenga, go off, and ſome of them branch again, and end in lakes. The Ruſſian frontier commercial town, Kiatka, lies (according to Pallas's Travels through Siberia to China) in

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lon. 124° 18′ E. from Ferro, and lat. 51° N. and is diſtant 3676 miles from Moſcow, and 1025 from Pekin. The frontier Chineſe town, Maitmatſchin, is on the oppoſite ſide of the river, which is only about one hundred and forty yards wide, and lies to the ſouth of Kiatka.

The principal commodities which Ruſſia exports to China are furs and peltry: the moſt valuable are the ſkins of ſea otters, beavers, foxes, wolves, bears, Bucharian lambs, Aſtracan ſheep, martens, ſables, ermines, grey ſquirrels, &c. Cloths, Engliſh, Pruſſian, and French; camblets, calimancoes, druggets, white flannels, rich ſtuffs, velvets, coarſe linen, Ruſſia leather, glaſs ware, looking glaſſes; hardware, as knives, ſciſſars, locks, &c.; tin, Ruſſian talk, camels, horſes, and horned cattle. The Chineſe alſo purchaſe at a great price hounds, greyhounds, barbets, and dogs for hunting wild boars.

At Kiatka, the fineſt Hudſon's Bay beaver has been ſold at twenty roubles a ſkin, or about five pounds Engliſh money, and otter ſkins at thirty-five roubles, or eight pounds twelve ſhillings; and the beſt Canada black fox ſkin has been ſold for one hundred roubles, or twenty pounds Engliſh.

The commodities imported from China by Ruſſia are: Raw and manufactured ſilk (the raw is prohibited in China under pain of death, but it is ſmuggled to Kiatka); raw and manufactured cotton; teas of the beſt ſort; porcelain, japan cabinets, and caſes, lacquered and varniſhed tables and chairs, boxes inlaid with mother of pearl, &c. fans, toys, and ſeveral ſmall wares; artificial flowers; tiger and panther ſkins; white-lead, vermilion and other colours; canes, tobacco, rice; ſugar-candy, preſerved ginger, and other ſweetmeats; rhubarb, muſk, &c. &c.

The Chineſe tranſport their goods to Kiatka chiefly upon camels. It

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is five days journey from Pekin to the Chineſe wall, and forty-ſix more to croſs the Mongol deſert to Kiatka.

In going to Kiatka they make the greater part of the journey by land, for two reaſons: one is, that in moſt of the rivers the ſtreams are rapid, and run the contrary way, which they take advantage of in returning; and the other, that in the journey by land they collect in their route ſkins and furs, and various ſmall articles for private trade.

The Ruſſian commodities are tranſported by land from Peterſburg and Moſcow to Tobolſk: from thence the merchants ſometimes embark upon the river Irtiſh, and go down to its junction with the Oby: then they either tow up their boats, or ſail up the laſt-mentioned river as far as Narym, where they enter the river Ket, which they aſcend to Makofffkoi-Oſtiog, at which place the merchandiſe is conveyed about ninety werſts (ſixty miles) by land to Yenirei: they then aſcend that river, and the Tunguſka and Angara to Irkutſk, croſs the lake Baikal, and go up the river Selenga to Kiatka. It is a voyage of ſuch difficulty againſt the ſtreams eaſtward, that it is hardly finiſhed in a ſummer; for which reaſon the merchants often prefer the way by land, and rendezvous at the fair of Irbit, near Tobolſk; from whence they go in ſledges during winter to Kiatka, where they arrive about February, the ſeaſon in which the chief commerce is carried on with the Chineſe. But on their return they deſcend by the rivers Selenga, Angara, Tunguſka, Ket, and Oby, to the junction of the latter with the Irtiſh; they aſcend that river to Tobolſk, and go up the Tobolſk river into the Iſet; at the head of which is a ſmall lake, whence a canal is cut into the river Tchuſovaia, which falls into the Kama, which latter river falls into the Wolga near Kaſan. The navigation of the Wolga, by Tzwer and Viſhrei Voloſhok, to lake Ladoga and Peterſburg, I have before mentioned.

In order to give the reader ſome idea of that vaſt tract of country,

over which merchandiſe is frequently tranſported by land carriage in the journey from Peterſburg to Kiatka, I ſhall add the following liſt of diſtances.

From Peterſburg to Moſcow, 734 werſts; from Moſcow to Tobolſk, 2385; from Tobolſk to Irkutſk, 2918; from Irkutſk to Kiatka, 471. In all 6508 werſts, or 4338 Engliſh miles, and two thirds of a mile. The diſtance by the rivers is much greater, as has been already obſerved.

CHAP.

CHAP. IV.

Canals of Sweden and Denmark—Canal of Trolhaetta in Sweden—Numerous Obſtructions and Impediments to its Completion—Prodigious Sums of Money and immenſe Labour that it has coſt—Polhem employed on it by Charles XII.*—His Plan, after an incredible Expence, and the Labour of ſeveral Years, proves abortive—Junction of the Lake Hielmar with the Maeler by a Canal—Junction of the Maeler with the Wenner—Canal of Carlſgraff—Difficulty of paſſing the Cataracts of Trolhaetta—Sluices conſtructed by Polhem deſcribed—Account of the Canal of Kiel, in the Duchy of Holſtein—Length, Breadth, and Fall of this Canal—Its Utility, by effecting a Junction between the Baltic and the German Ocean.*

SWEDEN has long been ſenſible of the utility of inland navigation. The following is a ſuccinct account, principally extracted from the Travels of the judicious and accurate Mr. Coxe, of the moſt remarkable works of this kind, that have been conſtructed or projected in that country.

At the village of Trolhaetta in the province of Gothland, and on the river Gotha, cloſe to the cataracts of that river, and near the entrance into the great lake Wenner, begins a ſtupendous work, intended to open a paſſage for veſſels, by means of a navigable canal, called from this place the canal of Trolhaetta.

This canal forms part of a plan long projected by the Swedes, to

unite the Baltic and the German ocean by an inland navigation, as well for the purpoſe of improving the interior trade of the provinces, as of preventing the interruption of their foreign commerce, which is the inevitable conſequence of a war with Denmark; for as all veſſels ſailing out of the Baltic muſt neceſſarily paſs through the Sound, they are expoſed to the Daniſh ſhips of war and privateers, who ſhelter themſelves under the batteries of Elſinoor, which command the paſſage of the ſtrait, unleſs a Swediſh fleet ſhould command the channel.

Guſtavus Vaſa was the firſt ſovereign who perceived the utility of ſuch an inland navigation, when he made Lodeſe, now Gotheborg, a ſtaple town of trade, that the merchant ſhips coming to Sweden might not be obliged to ſail through the Sound; and he conceived hopes, that, at ſome future period, merchandiſe might be tranſported from thence to Stockholm by means of the lakes Wenner, Hielmar, and Maeler, when the rivers and lakes which join them ſhould be rendered navigable. Eric XIV. deſirous to carry his father's deſigns into execution, gave orders for ſurveying the waters communicating with theſe lakes, and directed plans to be formed for joining them by artificial canals; but the execution of this great ſcheme was fruſtrated by the turbulence and misfortunes of his reign.

Several ſucceeding ſovereigns had this great object in view. Charles IX. promoted it by the Carlſgraf canal, and Charles XI. by that of Arboga. The undertaking, however, of forming a communication by water through the whole country, was always conſidered as a work of extreme difficulty. Motraye ſays, that Guſtavus Adolphus was inclined to encourage the deſign; but that as no perſon could be found in Sweden bold enough to engage in the enterpriſe, he adds, that Charles XI. ſent for ſome Dutch engineers, who, after they had meaſured the falls of the waters between the lakes Wenner and Hielmar, declared it to be impracticable. Difficulties, however inſurmountable they might appear

appear to perſons of more ſober underſtanding, were no obſtacle to the genius of Charles XII. The ſame author informs us, that the celebrated engineer Polhem laid before that king a propoſal for rendering the cataracts of Trolhaetta navigable; and for opening a communication, not only between Gotheborg and Stockholm, but alſo with the Wenner, the Vetter, and Nordkioping, ſufficient for the paſſage of very large veſſels. Polhem's plan was directly approved, and begun by Charles, ever fond of extraordinary projects; and though it was interrupted for ſome time by the king's death, it was again revived, with freſh vigour, under the late ſovereign Adolphus Frederic.

This plan may be divided into three principal parts. 1. The junction of the Hielmar with the Maeler. 2. That of the Hielmar with the Wenner. 3. That of the Wenner with the German ocean.

Firſt, the junction of the Maeler with the Hielmar. Theſe two lakes are united by the ſmall river Ulviſon, and the canal of Arboga: the former riſes to the weſt of Arboga, flows through the town, and falls into the Maeler at Kungſaer. The canal of Arboga is cut from the Hielmar, and continued to the Ulviſon, about half a mile to the eaſt of the town. It was begun in the reign of Chriſtina; but, being only calculated for ſmall veſſels, was widened and deepened by order of Charles XI. and completed under his ſucceſſor Charles XII. It belonged to the crown until 1769, at which period it had been ſo much neglected, as ſcarcely to be of any uſe; but a company of ſeven merchants of Orebro undertook to cleanſe and repair it at their own expence, upon condition of receiving the toll of all veſſels which ſhall paſs through it. The canal is, excepting in a few parts, ſufficiently broad to receive two veſſels a-breaſt; its lower depth is eight feet. It is chiefly ſupplied with water from the lake Hielmar, the ſurface of which is eighty feet perpendicular higher than its level. It conſiſts of eight ſluices or locks. The veſſels it admits are the ſame which navigate the lakes; they are decked and ſingle-maſted, ſeventy-ſix feet long, about forty-three tons burden, and draw

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between ſix and ſeven feet water when they have taken in their lading.

2. In order to join the Hielmar and Wenner, it was propoſed to open the navigation of the Swart-an, which falls into the weſtern extremity of the Hielmar at Orebro; to make a canal from that river to the lake Morken; from thence by the Leton to the Skager; and from the Skager, by the Gullſpang, to the Wenner. There is reaſon to conclude, from the accounts of perſons who have been on the ſpot, and inſpected the above-mentioned rivers, that they are ſo ſhallow and ſtony, that it would be very difficult and expenſive to render them navigable; and as the faint attempts hitherto made upon the Gullſpang have all failed of ſucceſs, it has been propoſed to cut a canal directly from lake Morken to Chriſtinehamn, which is ſituated upon the eaſtern ſhore of the Wenner: but as no part of this project has been yet begun, and the whole would be attended with very great difficulties, there is little proſpect that this branch of the great undertaking, the junction of the Hielmar and the Wenner, will ever be completed. On account of the almoſt inſuperable difficulties attending the junction of the Hielmar and the Wenner, a plan was projected to form an inland navigation from the eaſtern coaſt of Sweden, ſouth of the Maeler, by means of the Wetter, to the Wenner; and in 1774 a map was publiſhed, with a view to ſhew the ſcheme to be practicable.

3. The junction of the Wenner with the German ocean is next to be conſidered; and this might be accompliſhed by the river Gotha, which iſſues from the ſouthern extremity of the lake near Wenneſborg, and after a courſe of ſeventy miles falls into the ſea near Gotheborg, provided that river could be made navigable throughout its whole courſe; but as, on account of ſhoals and cataracts, its ſtream is greatly impeded, the communication has been attempted by the Carliſgraf canal, the canal of Trolhaetta, and the ſluices of Akerſtrœm and Edet, which therefore I ſhall ſeparately deſcribe.

The channel of the river Gotha not being open and free, from its firſt iſſuing from the Wenner, a cut from a bay of that lake to the river was begun under Charles IX. but was not entirely completed before the reign of Charles XII. Polhem, whom I have mentioned before, erected by order of that monarch a ſluice, which not being conſtructed upon a firm foundation, was ſcarcely finiſhed before it was undermined, and carried away by the water. From that time the Carlſgraf canal remained without a ſluice, and conſequently without a veſſel paſſing it, until the reign of Adolphus Frederic. In 1754 a new ſluice was finiſhed, which was called the ſluice of Teſſin, in honour of the prime miniſter of that name. It was formed by a ſubterraneous channel, forty feet long, eighteen broad, and twelve high; but theſe dimenſions were too ſmall for the admiſſion of veſſels of more than forty tons burden, and it frequently happened that even thoſe could not paſs, whenever there was either too much or too little water. To remove theſe difficulties, another ſluice, called, in honour of the preſent king, the ſluice of Guſtavus, was completed in 1768. This ſuperb work is a channel four hundred feet in length (the half of which is cut through the ſolid rock), and conſiſts of two locks, each two hundred feet in length, and thirty-ſix in breadth; the ſides are ſtrongly faced with brick and ſtone. The greateſt depth of water is thirteen feet, the loweſt ſix feet. The uſual veſſels which navigate this canal are of eighty tons burden; but when the water is high, larger may paſs. In 1777, one veſſel of a hundred and thirty-three tons worked its way through.

From the end of this canal to the village of Trolhaetta, which includes a ſpace of about five miles, the navigation of the river is uninterrupted; it flows in a gentle current, varies in its breadth from three hundred yards to a mile, and is in a few parts prettily ſprinkled with iſlands; ſome of which are barren rock, others tufted with wood, and covered with arable ſoil. Near Trolhaetta, two ridges of mountains, which, on each ſide, run at a ſmall diſtance from the river, approach its banks, and confine its ſtream within a narrow channel. In this place it is about four

hundred

hundred feet in breadth, as ſmooth as a lake, and without any viſible ſtream, exhibiting a ſtriking contraſt to the roaring of the torrent below. This ſmoothneſs of the water continues till it burſts at once into the cataracts of Trolhaetta, called the Gulfs of Hell, which render all farther navigation impoſſible. The bed of the river is ſolid rock; the banks are perpendicular; and, at the beginning of the fall, ſeveral granite iſlands, thinly ſtrewed with underwood, junipers, and ſtubbed pines, riſe in the midſt of the ſtream, forming ſmall ſtraits, down which the water daſhes with increaſing impetuoſity.

From the firſt opening of the fall to the part where the river again becomes navigable, is about two miles; but it does not roll through the whole of this ſpace in one uniform ſheet of water, or with equal rage and violence. It is divided into four principal cataracts, ſeparated by whirlpools and eddies, and forming, during the whole way, the moſt awful ſcenes, ever varying, and too ſublime to be accurately deſcribed. The perpendicular height of all the falls, conſidered as one, is about one hundred feet. From this deſcription, the reader will readily perceive the extreme difficulty of rendering theſe cataracts navigable; and it was even through the midſt of them that the daring projector attempted to form a canal, by the works I ſhall now proceed to deſcribe.

Juſt above the firſt cataract, called Praſtenkeſdet fall, ſeveral dams were conſtructed which turned the ſtream, and left the main bed of the river quite dry. In this part ſome rocks were cut through, and others blown up; the bed was rendered level, and the cataract nearly turned into ſtill water. To continue the navigation, an iſland of red granite, called Malg, which riſes in the midſt of the great cataract, was divided, and a canal formed through it of three hundred and forty feet in length, including a ſluice of thirty feet. The depth of the fall, and of courſe of the perforated rock, is twenty-three feet four inches; the breadth eighteen feet. This is called Ekerbrad ſluice, and was deſigned to conſiſt of two locks. At a ſmall diſtance another canal was formed on the ſide of the

the ſecond great cataract. Through a kind of promontory, which projects into the ſtream, the ſolid rock of granite was hollowed eight hundred and ſixty feet in length, fifty-ſix feet ſix inches in depth, and eighteen feet in breadth. This ſluice was called Polhem's ſluice, and was to conſiſt of three locks, by which veſſels were to be let down a fall of fifty-ſix feet ſix inches. At the diſtance of two thouſand nine hundred and twenty feet, a third cut was made to the Flateſberg fall, terminating in the ſluice of Elvius, the laſt of this projected plan. The length of the cut is twenty-eight feet, the breadth eighteen, and the depth or height of the fall thirty-four feet three inches. In order to form ſome idea in what manner the navigation was to be continued from the ſluice of Polhem to that of Elvius, it will be neceſſary to give a deſcriptive view of the intervening ſpace.

A little below the ſluice of Polhem, the river daſhes through a narrow paſſage, called Stampſtrœm; from thence it gradually widens into a kind of bay, named Hoyon's warp: it is again cramped into a narrow channel by the nearer approach of rocks on each ſide, and forms a cataract, called Helvert's fall; at the extremity of which it expands itſelf into a ſmall baſon, called Ali-Halla; and then again precipitates itſelf at the Flateſberg fall, from whence it becomes navigable. Inſtead of continuing any works through the cataracts, or by the ſide of the river, the communication between the ſluices of Polhem and Elvius was attempted in the following manner: A dyke of ſtone was conſtructed acroſs the river, juſt below the Flateſberg fall and the ſluice of Elvius, and forming a level with the bottom of Polhem. This chimerical project, which ſeems rather too ridiculous to have been ſeriouſly entertained, was however attempted. The king himſelf viſited the work, and all Sweden was in eager expectation that the favourite project of the nation would at length be completed. The dyke was built; the river had riſen twelve feet of the thirty-four; when, in an inſtant, the weight of waters burſt the barrier too feeble to reſtrain them, and ſwept away in an inſtant the labours and expence of ſeveral years. The im-

menſity of the expence will be beſt conceived by conſidering that all the cuts were made through the ſolid rocks of granite. Large ſubſidies had been annually raiſed for the proſecution of the work, and the national bank had readily advanced ſtill greater loans; the ſum total of which has never been divulged. The failure of the project, after ſuch immenſe labour and enormous expence, occaſioned great diſcontents among the people; many of whom to this day believe, though there ſeems no foundation for the ſuppoſition, that the projectors, bribed by the Danes, purpoſely proceeded upon a plan which they knew could not ſucceed. But thus much is evident: that throughout the whole undertaking, the works, ſtupendous in themſelves, were conducted without proper care and attention; for, after all, the cuts which had been excavated with ſuch difficulty, being only eighteen feet in breadth, would have been too narrow to have admitted veſſels of ſuch ſize and burthen as uſually navigate the lake Wenner. In a word, ſeveral ill-judged meaſures ſeem to have been taken; otherwiſe, although there were many natural obſtructions to the ſucceſs of the enterpriſe, yet greater obſtacles have been ſurmounted. But Polhem was not a BRINDLEY.

In conſequence of this failure, all the works and ſluices hitherto raiſed were neglected as totally uſeleſs, and a new plan for the canal of Trolhaetta has been projected; according to which, inſtead of being carried, as before, along the channel of the river, it is to be cut through the ſolid rock that forms its banks. The plan of this laſt project is thus deſcribed: The length is to be four thouſand ſeven hundred feet, the breadth thirty-ſix feet, and the depth, in ſome parts, fifty feet or more. It is to conſiſt of nine ſluices; and when we reflect that the whole of this cut muſt be hollowed through the red granite, it is evident that it will be attended with many, if not more difficulties, than were experienced in the former attempt. It muſt by no means, however, be condemned as impracticable. The canal of the duke of Bridgewater, that of Languedoc, and the road through the mountain Gemmi, in Switzerland,

Switzerland, prove that ſcarcely any thing is impoſſible to human induſtry.

The chief queſtion, in this reſpect, ſeems to be, whether the enormous expence attending the execution of the work, will be compenſated by the advantages reſulting from its completion. And here, if we merely take into conſideration the navigation from the Wenner to Gotheborg, we may venture to decide in the negative. But if we preſume, that at any future period a communication will be formed from the gulf of Bothnia to the Wenner, as in that caſe the cataracts of Trolhaetta would be the only remaining interruption to the inland navigation from the eaſtern to the weſtern coaſt of Sweden, the accompliſhment of this canal could not ſurely be obtained at too dear a rate.

His preſent majeſty, who ſoon after his acceſſion viſited theſe works at Trolhaetta, wiſely ordered them for the preſent to be ſuſpended; but that the ſluices of Guſtavus and Aker ſhould be finiſhed without delay. Meanwhile, in order to facilitate the tranſport of merchandiſe from the diſtricts bordering upon the Wenner to Gotheborg, a wooden road has been conſtructed on the ſide of the river, from the beginning to the end of the cataracts. It is ſupported upon poſts over the rocks, which, from their irregularity and roughneſs, would have been almoſt impaſſable for horſes.

About a mile below the cataracts, the courſe of the river Gotha is again interrupted by a fall, called Akerſtrœm. Here a canal has been made through a rock which projected into the river; the length of it is one hundred and eighty-two feet, including the ſluice, the depth twenty-ſix, and the breadth thirty-ſix feet. This cut was begun in 1774, and it was expected would be opened in 1781.

From Akerſtrœm the river is clear to Gotheborg, excepting at Edet,

where its paſſage is ſtopped by a bed of rocks riſing in the midſt of the ſtream. On one ſide of theſe rocks another cut has been made, ſix hundred feet in length, twenty in depth, but only eighteen in breadth. This work is ill executed, and in bad order. A petition had been preſented to the king, that it might be repaired and improved to the ſame breadth as Aker ſluice; and there was no doubt but that it would be done.

The iron, and other merchandiſe, is now conveyed over the lake Wennerſborg, and thence through the Carlſgraf canal, and down the river Gotha to Trolhaetta. Upon coming to the cataracts, the goods are unloaded, and carried along the wooden road, about two miles, to the end of the falls. There they are again embarked, and paſſing through the Akerſtrœm and Edet ſluices, ſuppoſing that they are by this time completed, arrive without further impediment at Gotheborg. In return, ſalt, ſpices, corn, tea, and other commodities of interior conſumption, are ſent up, by the ſame channel, into the provinces about the Wenner.

Thus, for more than a century, the ſchemes and efforts of all the engineers employed in Sweden, both natives and foreigners, to conſtruct works of the greateſt importance to the country, failed of ſucceſs. In England, if I may be permitted the obſervation, were the ſame advantages to be expected from ſurmounting equal difficulties, I have not a doubt but engineers might be found to accompliſh ſuch an undertaking, and private individuals to begin and complete it, without any aſſiſtance from government.

D E N M A R K.

BEFORE I particularly deſcribe the canal of Kiel, it may not be improper to give a ſhort account of that capital of Holſtein, being a part of his Daniſh majeſty's dominions.

Kiel

Kiel poſſeſſes a univerſity for the German ſubjects of Denmark, which was founded in 1650 by Chriſtian Albert, duke of Holſtein Gottorp, and has lately been conſiderably enlarged by his preſent majeſty. It contains twenty-four profeſſors, and about three hundred ſtudents. The town ſtands upon a ſmall peninſula in a bay of the Baltic, and has a very commodious harbour for ſhips of the largeſt ſize. It is already one of the moſt commercial places of Holſtein; and its trade will be ſtill further augmented, when the inland navigation acroſs the peninſula ſhall be completed.

The inland navigation for the junction of the two ſeas, is to be formed through the duchy of Holſtein, by the canal of Kiel and the river Eyder, which runs by Rendſburg, and falls into the German ocean at Tonningen.

The canal begins about three miles north of Kiel, at the mouth of the rivulet Lewen-ſawe, which heretofore ſeparated Holſtein from Sleſwick, and will form a new boundary between thoſe two duchies. The diſtance from its beginning to the laſt ſluice at Rendſburg, is twenty-ſeven Engliſh miles; but as the river Eyder is navigable about ſix miles and three quarters above Rendſburg, and only requires to be deepened in ſome places, the cut which is neceſſary for the completion of the communication between the two ſeas, will be only twenty miles and an half.

The canal was begun in July 1777, and in April 1779 it had been carried about ſix miles, as far as Sucdorf; and it was computed that the whole would be completed in 1784. The work was performed by contract: one thouſand and twenty-four cubic feet * of earth were to be taken out for eight ſhillings, and the whole expence was to amount to about two hundred thouſand pounds.

* The foot uſed in Denmark is to the Engliſh as 21 to 22.

Between the Flemhuder lake and the rivulet Lavens is the higheſt point, on each ſide of which the waters take different courſes to the Baltic and German ocean: in this part the ground muſt be opened to the depth of fifty feet. The perpendicular fall towards the Baltic is twenty-five feet ſix inches, and that towards the German ocean twenty-three feet; and the veſſels will be raiſed up or let down by means of the ſix following ſluices: Holtenau, Knorp, Sucdorf, Shinkel, Niederholten, and Rendſburg. The breadth of the canal is one hundred feet at top, and fifty-four feet at bottom; the ſluices are twenty-ſeven feet in breadth, and one hundred feet in length; and the leaſt depth of water is ten feet. The canal will be furniſhed with water as far as Steinwarp from the Eyder, and the lakes Flemhuder and Weſter, and from thence to Rendſburg by the lake Wetter, from which flows a rivulet that joins the Eyder. Common merchant-veſſels, of about one hundred and twenty tons burden, will be able to navigate this canal.

The utility of this important undertaking will be evident, from a mere inſpection of the map of Denmark. It may be obſerved, that even the ſmalleſt veſſels, trading from any part of the Daniſh dominions in the Baltic to the northern ſeas, muſt make a circuit round the extremity of Jutland, and are liable to be detained by adverſe winds. This navigation is ſo tedious, that goods ſhipped at Copenhagen for Hamburg are, not unuſually, ſent by ſea only to Lubec, and from thence by land to Hamburg. But the completion of this canal will enable veſſels not exceeding one hundred and twenty tons, or not drawing above ten feet water, to paſs immediately from the Baltic into the German ocean, and proceed without unloading to Hamburg; or ſail to Holland, England, or other parts, which in times of war receive ſupplies from Denmark.

CHAP. V.

Canals of Holland—Extenſive Trade carried on by them—Canals of Flanders—Their ruinous Condition at preſent.

THE induſtrious Hollanders, from mere neceſſity, and hatred of their oppreſſors the Spaniards, have with the greateſt labour cut ſuch a multitude of canals in every part of the low, narrow, ſwampy, boggy provinces they inhabit, which can ſcarcely with propriety be called land, that for commerce, riches, and population, they may now vie with any other country on the face of the earth, in proportion to its ſize, not even excepting China.

One third, at leaſt, of this country has been gained from the ſea, by the means of vaſt dykes and mounds, ſome of which are twenty-one yards in thickneſs, and which muſt continually be kept in repair, with prodigious labour and at an incredible expence, to prevent the whole country from being inundated.

The ſeven united provinces, commonly called Holland, are interſected with innumerable canals, which it is not my intention to deſcribe circumſtantially, ſince that would be to give a geographical ſurvey and hiſtory of the country. They may be compared, for number and ſize, to our public roads and highways; and as the latter with us are continually full of coaches, chaiſes, waggons, carts, and horſemen, going to and from the different villages, towns, and capital cities; ſo, on the former,

mer, the Hollanders, in their boats and pleaſure-barges, their trekſchuyts and other veſſels, are continually journeying and conveying commodities, for conſumption or exportation, from the interior part of the country to their great cities and rivers. An inhabitant of Rotterdam may, by means of theſe canals, breakfaſt at Delft or the Hague, dine at Leyden, and ſup at Amſterdam, or return home again before night. By them alſo a prodigious inland trade is carried on between Holland and every part of France, Flanders, and Germany. When the canals are frozen over they travel on them with ſkaits, and perform long journeys in a very ſhort time; while heavy burdens are conveyed in carts and ſledges, which are then as much uſed on the canals as in the ſtreets.

The yearly profits produced by theſe canals are almoſt beyond belief; but it is certain that they amount to more than two hundred and fifty thouſand pounds for about forty miles of inland navigation, which is ſix hundred and twenty-five pounds per mile, the ſquare ſurface of which mile does not exceed two acres of ground; a profit ſo amazing, that it is no wonder other nations ſhould attempt to imitate what has been found ſo highly advantageous.

The canals of Oſtend, Ghent, Antwerp, Bruſſels, &c. cannot at preſent claim much praiſe. This country has had its day of commerce, when Europe was in its infancy of improvement; but it yet poſſeſſes great wealth, and is extremely populous; it yet carries on conſiderable manufactures, although it is no longer the great mart for commerce, as it was two or three hundred years ſince. Its fortified towns, population, and canals, ſufficiently prove what it has heretofore been; and it were to be wiſhed that its inhabitants, who have made a bold attempt to obtain liberty, were leſs under the influence of bigotry and ſuperſtition.

The cities of Flanders are no longer in the flouriſhing ſtate in which they were ſome centuries paſt. The canals, which were then numerous,

kept

kept in good order, and filled with veſſels laden with merchandiſe from every part of the known world, are now entirely neglected and out of repair. Holland on one ſide, and France on the other, have not only encroached on their territories, but diminiſhed their trade. The city of Amſterdam roſe to opulence on their decline.

So early as the twelfth century the ſpacious foreſts of Flanders were cut down, and the ſoil was laid open to the rays of the ſun; large canals were cut for inland navigation, which, while they drained the land, opened a communication for the inland commerce of the country. The river Scheld was compelled to yield up fruitful fields which had long been hidden beneath its waters, and was reſtrained within its channel by two prodigious dykes.

A ſpacious canal, a work of the ſixteenth century, extends from Bruſſels (once the reſidence of the dukes of Brabant and Burgundy) to the Scheld; which, though not open to veſſels of theſe provinces where it enters the ſea, yet affords a communication with Holland, and, by the canals of Flanders, with the ocean. By this canal the city ſtill carries on ſome traffic; and we find, at a diſtance from the ocean, and where there is no navigable river, a port filled with veſſels of every kind, adapted to all the purpoſes of trade and pleaſure.

The French, when maſters of Bruſſels, reſpected the lofty trees of the *Cours*, or *Allée-Verte*, which borders this extenſive canal. The outlets of the city lead, on every ſide, to a pleaſant and fruitful country.

On the northern banks of the Scheld, in the county of Waſs, below Ghent, the prince of Parma, during the memorable ſiege of Antwerp, cut a canal which ſtill remains.

The Flemiſh cities, ſituated in fertile plains, by the ſide of rivers and navigable canals, were advantageouſly placed for maintaining

thoſe multitudes of inhabitants which they formerly contained, and the advancement of that commerce for which they were ſoon diſtinguiſhed. The free fairs, the origin of which is very ancient, and of which, though they are now of leſs utility, the remains are ſtill to be found here, are ſuppoſed to have been firſt eſtabliſhed in this country.

CHAP. VI.

Canals of France—Canal cut by Lucius Verus—Canal of Briere—Canal of Orleans—Canal of Bourbon—Junction of the Somme with the Oiſe—Particular Deſcription of the celebrated Canal of Languedoc.—Trade carried on by that Canal—Other Canals in France—Canals propoſed to be cut in that Country—Deſcription of the magnificent Aqueduct of Maintenon, built by Louis XIV.—Canals of Spain—Canal of Arragon—Canal of Caſtile—Canal of Murcia—New Canal from the Eſcurial—Canal begun, but not completed—The interior Parts of Spain capable of great Improvement by Canals.

FRANCE furniſhes us with numerous inſtances of induſtry and ingenuity, exerted in the conſtruction of canals for inland navigation.

The firſt of which hiſtory gives an account was that projected by Lucius Verus, who commanded the Roman army in Gaul, under the emperor Nero, to join the river Moſelle with the Rhine.

The canal of Briare, called alſo the canal of Burgundy, was begun under Henry IV. and finiſhed in the reign of Louis XIII. It forms a communication between the Loire and the Seine, and conſequently to Paris; it begins from the Loire at the town of Briare, paſſing by Chatillon-ſur-Loing to Montargis, where it takes the name of the canal of Montargis; juſt above which town it joins the canal of Orleans, and then proceeds on in one canal by Chau, Landon, Nemours, and Moret,

and falls into the Seine near Fontainbleau. It is of the greateſt utility to all this part of France, and even to Burgundy. This canal has forty-two locks and ſluices; and by it Paris is ſupplied with corn, flour, and proviſions, as well as the other productions of ſeveral provinces, ſuch as Provence oils, dried fruits, hardware, muſcadel wines, paper, and other merchandiſe; and in return the cloths and ſtuffs, camblets, &c. of Abbeville, Amiens, Rheims, Sedan, and Liſle, are alſo ſent by this communication to the ſouthern parts of France.

The canal of Orleans, which joins this canal near the town of Montargis, was begun in 1675, to effect a communication between the Seine and the Loire near to the city of Orleans. It is conſiderably ſhorter than the canal of Briare, and has only twenty locks and ſluices. By this canal the inhabitants perform by an inland navigation, in their *bateaux-coches* (coach-boats or water-coaches), a voyage (or journey) to the neighbouring towns, and even to the city of Paris itſelf. Theſe vehicles ſet out at ſtated times and places, for the convenience of paſſengers, and conveyance of all ſorts of goods. They are large and covered, and exceedingly well adapted for the purpoſe.

On this canal and the river Loire a number of ſmall veſſels are faſtened to each other, and aſcend upwards by ſails when the wind ſerves; or, when that fails, are towed by men, ſeventy or eighty men ſometimes working at a ſingle rope.

The canal of Bourbon has been but lately undertaken; it is intended to effect a communication from the river Oiſe to Paris, to prevent, as far as might be in the power of human prudence, the poſſibility of a ſcarcity in that city.

The junction of the river Somme with the river Oiſe by means of a canal, which is called the canal of Picardy, affords a ready conveyance to Paris for the grain of Picardy; the ſea-coal, wood, butter, copper, and

ſpices from the northern provinces of the kingdom, and from Holland. This canal begins at St. Quintin, and is cut to near the town of Ham on the river Somme, whence it croſſes the country into the river Oiſe, near Lafere; from whence veſſels proceed down that river to Chauny, where the river is navigable, into the Seine, and ſo to Paris, and by Rouen to the ſea.

From the town of Landau a canal is cut into the Rhine, near Spires, which is called the canal of Landau.

The canal of Languedoc, called alſo the canal of the Two Seas, which forms a junction between the ocean and the Mediterranean, was firſt projected under Francis I. but begun and finiſhed under Lewis XIV. It does honour to the able miniſter Colbert, and to Riquet, the engineer who conducted the work.

This amazing undertaking was begun in 1666, and finiſhed in 1681. It has anſwered every expectation formed from it, and eſtabliſhed a ready communication between the two fertile provinces of Guienne and Languedoc. This canal extends from Narbonne to Thouloufe. It receives ſeveral little rivers as feeders in the way, and is provided at proper intervals with one hundred and fourteen locks and ſluices. In ſome places it is conveyed by aqueducts over bridges of incredible height and ſtrength, which under them give paſſage to other rivers.

What appeared moſt extraordinary at that time was, that near the town of Beziers it was conveyed under a mountain by a tunnel (a method which has now become common) ſeven hundred and twenty feet in length, cut into a lofty arcade, and the greateſt part of the way lined with free ſtone, excepting towards the ends, where it is only hewn through the rock, which is of a ſoft ſulphurous ſubſtance. The expence of this work was thirteen millions of livres, about five hundred and forty thou-

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ſand pounds, of which the king contributed ſeven millions, and the province of Languedoc the remainder.

I ſhall here give a conciſe deſcription of this great work, the wonder of Europe, that modern engineers and projectors of inland navigations may be encouraged to encounter all difficulties that may oppoſe their patriotic labours.

This canal begins at Cette in the bay of Languedoc, and paſſes through the lake Thau to the town of Agde, where is a round canal baſon with three openings, and three different depths of water meeting there; and the gates or locks are of ſuch ingenious conſtruction, that the veſſel may paſs through by opening either of them, which the maſter pleaſes; a contrivance which excited admiration in the great Vauban himſelf.

Not far from Beziers, and beyond the tunnel already mentioned, are eight locks, which form a grand and regular caſcade nine hundred and ſixty feet long, and by means of which the veſſels croſs the river Orb, and, continuing their voyage on the canal, paſs the towns of Beuers, Argens, Treſbes, Orbiell, Alzenne, Villepinte, into a large baſon near Caſtlenaudury, which receives the river Laudet. At St. Ferriol, near the town of Reuel, Mr. Riquet conſtructed a reſervoir to ſupply the canal, containing five hundred and ninety-five acres of water, which is firſt embanked, and then the embankment walled round with free ſtone, between two rocky mountains. Under this dam runs a vaulted arch or ſewer, reaching to the main wall, where three large cocks of caſt braſs are turned, opened and ſhut by iron bars; theſe cocks diſcharge the water through their mouths, which are as large as a man's body, into the aqueducts, and the baſon at Norouſe, which is the head of the navigation. The canal then deſcends from Norouſe by Avignenel, Monteſquieu and Baziege into the river Garonne by three locks, about a quarter of a mile below the city of Thouloufe which it paſſes. Its breadth is one

hundred

hundred and forty-four feet, towing-paths included; its depth ſix feet, and its length ſixty-four French leagues. It is here to be obſerved, that Narouſe is the higheſt part of the navigation, being about ſix hundred feet above the level of the two waters, from whence the ground has almoſt one continued deſcent to them on each ſide. On this ſpot, as was before obſerved, Riquet made his baſon, and collected his waters; and hither he brought his current of water from the adjacent mountain by an aqueduct five leagues in length, which contained between five and ſix thouſand cubic inches; and this ſtream being diſtributed in the two canals laſt mentioned, forms, in every part, a body of water of above ſix millions of cubic feet.

When a veſſel or barge in its paſſage from Narbonne, after it has ſailed through the canal that traverſes the plain, has arrived at the foot of one of theſe locks, the gates are inſtantly opened, and the water ſo hemmed in ruſhes forth with impetuous violence, and, mixing with that in the canal, forms one common level: when the veſſel ſails into the lock and the gates are ſhut again, the water which deſcends from the upper lock riſes by ſlow degrees ſeveral feet in height, ſeldom leſs than ſeven or more than twelve; the veſſel accordingly riſes with it till it comes to a level with the water contained in the ſecond lock, by means of which a veſſel that is coming from Narbonne may paſs without any obſtruction out of the firſt lock into the ſecond, or one coming from Thouloufe may be introduced out of the ſecond lock into the firſt, the gates of the ſecond lock being ſhut: the veſſel in the ſame manner mounts into the third; and thus it aſcends from lock to lock till it comes to the top of diſtribution, and then by the ſame kind of convey-ance falls down to Thouloufe. To preſerve the level, they have been frequently reduced to the neceſſity of turning and winding the canal round hills and riſing grounds, and to fortify it with an immenſe number of piles in thoſe places where the earth was likely to give way. This canal was conveyed by water bridges and ſtone arches over valleys; hills, and mountains were levelled; while through others a paſſage was cut

and arched over, large enough for the veſſels to paſs under with their cargoes, with lights and air-holes at proper diſtances.

Above twelve millions of cubic feet of earth, and more than thirty thouſand cubic feet of ſolid rock, have been removed to hollow out its bed. It has on it a hundred and fourteen locks. Sixteen prodigious large mounds have been raiſed to divert the courſe of ſuch waters as might any way obſtruct the paſſage of veſſels; and twenty-four large ſpacious drains have been made to empty it, whenever there ſhall be danger of its being clogged up, or too full. On a moderate computation, there are above two hundred and forty thouſand cubic feet of ſtone work in theſe erections, including a projection into the ſea of two hundred fathoms, and a pier of five thouſand fathoms more, which at preſent ſecures the port of Cette, and renders it a very commodious harbour; the advantage of which is the greater, as the coaſt of Languedoc has no havens whatever, and is very dangerous.

The expence of this aſtoniſhing work was nothing in compariſon with its utility.

Notwithſtanding France abounds with canals which interſect the country, and join not only rivers but ſeas to each other, to the great improvement of the internal part of the kingdom, and the encouragement of the huſbandman and manufacturer, who thus find a cheap, eaſy, and ready conveyance for their commodities to a market and the metropolis; yet have we ſeen France, immediately on the concluſion of the American war, after the very active part ſhe had taken in it, turning her attention to the advantages which Holland derives from her inland commerce. She is now imitating her example, and, at an enormous expence, actually cutting three canals or branches of great length to join the moſt navigable rivers, for the improvement of trade and manufactures. On the reduction of the army and navy in 1782, theſe canals were immediately begun, to give employment to the

the diſbanded ſoldiers and ſeamen, that thoſe uſeful members of ſociety might not be forced to emigrate to foreign countries, languiſh in idleneſs, or ſtarve in priſons; or, what is worſe, through want and neceſſity, perhaps, come to an untimely death.

The firſt of theſe three canals will extend the ſpace of twenty-four leagues, from Chalon-ſur-Saone to the town of Digoin on the Loire, and form a junction of the river Saone and the Rhone with the Loire. It is to be called the canal of Dehune.

The courſe of the ſecond canal will be from St. Jean-de-l'Aune to the village of Roch, between St. Florentin and Joigny, a ſpace of fifty-two leagues. It is called the canal of Burgundy, and will open a communication between the Saone, the Rhine, the Yonne, and the Seine.

The third canal will begin from the village of St. Symphorin on the Saone, a little above St. Jean-de-l'Aune on the oppoſite ſhore, to the town of Dole on the river Doubs, and, paſſing the city of Beſançon, will be continued below Straſburg, and form a junction of the Saone and the Rhone with the Ill and the Rhine. A great part of this canal has been finiſhed ſome time. It is called the canal of Neufbriſſac, and falls into the river Ill. The above great undertakings are purſued with ſo much vigour and activity, and are expected to be productive of ſuch great advantages to the moſt valuable branches of manufactures, that, unleſs a delay ſhould be occaſioned by ſome unforeſeen accident, it is imagined they will all be very ſoon completed.

By theſe navigable canals there will be a cheap, eaſy, ſafe and certain conveyance of goods from Marſeilles, the Mediterranean, Italy, and Switzerland, to the bay of Biſcay and the ocean, and alſo to Holland and Germany, as well as to Flanders and all the Auſtrian Netherlands; and during any future war with England, France will be able, by them, to ſupply her dock-yards at Marſeilles and Toulon, as alſo her grand

arſenal and dock-yards at Breſt and Rochefort, with all ſorts of ſtores and commodities from the Baltic, without hazarding a voyage by ſea; whereas they are now obliged to be brought from the Baltic down the Engliſh channel to Breſt, and through the ſtraits of Gibraltar to Toulon, at the utmoſt riſk of becoming the prize of our ſhips of war and privateers; or they muſt go north about, which is a long and dangerous voyage.

Since the canal of Languedoc has proved of ſuch advantage to the town of Cette and the adjacent country, other places have been induced to copy the example. From Cette another canal has been cut, called the canal of Grave, which goes into the lake Mauguis, near to the city of Montpellier; and another canal out of the ſaid lake, to the town of Lunel, called the canal of Lunel.

There is another canal out of the bay of Languedoc, through two lakes, to the town of Beaucaire, on the river Rhone.

There is alſo another canal out of this canal, which proceeds to the village of Guveral, into the river called the little Rhone.

There is another canal from the town of Taraſcon on the Rhone to the town of Arles on the ſame river, and down into the lake which falls into the bay near the mouths of the Rhone. It is called the canal of Boue.

Two other canals go out of this canal, one near the town of Arles, the other at the head of the aforeſaid lake; and the latter is called the canal of Crapone, and goes into the river Durance near Mirandol.

There are three other canals out of this river, near to the city of Avignon; one is called the canal of Crillon, another the canal of Real, and the third the canal of Boiſgelin.

There is another canal cut out of the above canal, near to Eyguires, into the great lake Berre, near the village of Iſtris, and which paſſes by the village of Salon.

There is alſo another canal out of the other ſide of the ſaid lake to the village of Pailiaſent; theſe two canals, being into and out of the ſame lake, are called the canal of little Crapone.

Theſe canals are in the ſouthern part of France. I ſhall now enumerate thoſe in the northern parts of the country; and firſt begin with the canal from Dunkirk to Furnes, called the canal of Dunkirk.

There is another canal from Dunkirk to Bergues, called by the ſame name.

There is another canal from Bergues to Furnes, called the canal of Furnes.

There is alſo another canal from Furnes to Nieuport, called the canal of Nieuport.

Another canal proceeds from Bergues, by the village of Colme, to St. Omers, and is called the canal of Bergue. This canal is continued from St. Omers into the river Lys, at the town of Aire, and is called the canal of Aire.

Another canal, cut in the year 1681, begins juſt above the town of Calais, and is carried acroſs the country into a river near the town of Audriue, which runs down to Gravelines. Theſe canals interſect the country, and are not only uſeful for navigation, but for draining that low country, which otherwiſe would be a bog, and covered with water, whereas by this means it is rendered, perhaps, one of the moſt fruitful countries in Europe.

A canal communication by locks is made between the towns of Lens, Liſle, Douay, and the rivers upper and lower Deule, the Scarpe and the Scheld. From the city of Liſle the canal takes a courſe near La Biſſe and Lens to Douay, and is called the canal of Liſle and Douay; from thence it returns back, and goes out of the Scarpe, paſſes near Marchienne, and joins the Scarpe again at the town of St. Amand, from which it returns back, with a very acute angle, three parts of the way to Douay, and parallel on the other ſide of the Scarpe, and is called the canal of Tritaire.

Many other parts of the kingdom have canals of communication. Three canals are cut out of the ſmall river Bonne, near to the city of Grenoble; and another is cut lower down that river. It goes out of the river Drac, and is called the canal of Merbeys.

A ſmall canal is cut out of the river Pau, near to the city of Pau; it is called the canal of Leſter.

Another canal is cut out of the river Adour, near the village Barcelonne, which goes to the town of Adour.

There is a canal cut out of the bay of Rochelle, to the town of Lucon, called the canal of Lucon; and near the ſame place the courſe of a canal is marked out from the mouth of the river Saigre into the river Claine, near to the city of Poitiers. This, when finiſhed, is to be called the canal of Poitou.

A canal, called the canal of Monſieur, is cut out of the Loire at Chalonne, and paſſes by Layon Thouarce to Martigne. Another canal is cut out of the fork of that river and Mayenne, near the town of Angiers, and proceeds to the town of Auchion.

A ſhort canal is cut out of the bay oppoſite to the iſland of Belliſle, to the town of Vannes.

Theſe

Theſe canals, already finiſhed, meaſure in length eight hundred and fifty-eight thouſand toiſes, or one thouſand nine hundred and thirty-nine Engliſh miles.

Beſides the before-mentioned canals, which are finiſhed, there are a great number of others projected, to find employment for the ſoldiery. I ſhall here enumerate ſome of them which have come within my own obſervation.

From the city of Valenciennes a canal is marked out, to paſs by Queſnoy into the river Sambre, near to the town of Berlarmont. It is to be called the canal of Queſnoy.

From the village of Hennecourt a canal is marked out near Cambray, on the river Scheld, to join that canal which is finiſhed, and which I have before mentioned, at St. Quentin, called the canal of Picardy. This canal is intended to go from St. Quentin to Siſſy on the Oiſe, and is to be called the canal of Souterin. This canal, when finiſhed, will join the Scheld with the Oiſe.

Another canal is marked out higher up the Oiſe, at the town of Guire, to join it to the Sambre at Fenny (or Ferney) near to the town of Landrecy.

Another canal is marked out from the Oiſe below the canal of Picardy, at Chauny, to go to Laon, and return with a ſharp angle into the river Vette at Aniſy. It is to be called the canal of Laon.

From the river Somme, near the city of Amiens, a canal is marked out to paſs by Corbie, Bray, and Peronne, to Ham, and join the canal of Picardy near the laſt town, which conſequently will join the Somme with the Oiſe.

Another canal is marked out from the Oiſe at the village of Criel, below

below Compiegne, to the town of Bevois, to be called the canal of Bevois.

Four canals are marked out near the city of Paris; one from the Oiſe, at the Iſle Adam, to cut into an elbow of the Seine at St. Dennis, and then out of the river ſtraight to Paris: another canal is marked out from the Seine acroſs the country into the river Mome at Gournay: a third canal is marked out from an elbow of the Seine, above St. Dennis, to Paris; and a fourth canal is marked out from Verſailles into the Seine, at the elbow at Sevres, near to Paris.

A canal is marked out to join the Meuſe at the village of Pagney, with the Moſelle, at the town of Toul.

A canal is marked out at Coſney on the Loire, to join the Yonne at the village of Swai, to go down that river to the Seine, and to be called the canal of Coſney.

A canal is marked out from the little river Love, at the village of Lignon, to join the canal of Burgundy at Dijon.

A canal is marked out from the Rhone at Geiſſial, to fall into the lake of Geneva at Verſoix, to be called the canal of Verſoix.

A very large and long canal is marked out from the bay, near to the city of Marſeilles, to paſs by Gardane, and near the city of Aix, to the villages Foutouble and Lambeſte, and return with an acute angle into the river Durance, near to the fork where the river Verdon goes out of that river: this canal is to be called the canal of Provence. A ſmall canal is already finiſhed, cut out of the Durance to the ſmall town of Pertuis: it is called the canal of Durance.

A canal is marked out of the river Tet, in the ſame bay, and is intended

tended to paſs by the city of Perpignan to the village of Millas; and another is marked out from the city of Perpignan, into the lake Nazaire, at the village of Salcos.

If we now paſs to the other ſide of the kingdom, we ſhall find a canal marked out from the Garonne, at the village of Inſtres, into the river Leyre at Bellin, which is to be called the canal of Autre.

Another canal is marked out from the Garonne, at the city of Bourdeaux, into a lake called Baſſin de Arcachon, and to proceed from one corner of it, at the village of La Tête de Bouc, into the ſea: it is to be called the canal of Bourdeaux.

A canal is marked out from the mouth of the river Saigre, near to the city of Rochelle, into the river Clain, near the city of Poitiers: it is to be called the canal of Poitou.

A canal is marked out from the Loire at the town of Saumur to Moncontour, to be called the canal de Deſſechement.

Several other canals are marked out and projected, too tedious and perhaps unintereſting to mention: we may however obſerve, from the enumeration already given, with what care and aſſiduity the French nation are improving every internal part of the kingdom, by canals cut from one river into another, and ſome even into the Mediterranean, and the ocean.

The lengths of theſe different canals, being added together, make four hundred and fifty thouſand toiſes, or five hundred and forty-five Engliſh miles; an amazing extent of country to improve by inland navigation, which they are ſanguine enough to hope will be entirely completed before the year 1800.

I cannot

I cannot omit to mention, before I leave the ſubject of France, another magnificent work of Louis XIV. as if his grand canal were not ſufficient to immortalize his name: I mean the famous aqueduct he built near Maintenon, for carrying the river Bure to Verſailles, from one mountain to another, acroſs a valley, which contains two hundred and forty arcades, and is ſeven thouſand toiſes, or nearly eight Engliſh miles and a half long, and raiſed to ſuch an elevation, that it is certainly altogether the greateſt piece of modern architecture of the kind in the world.

SPAIN.

SPAIN is a vaſt body without a ſubſtance, which has greater riches than ſtrength. The mines of Mexico and Potoſi furniſh that kingdom with means to purchaſe every thing except liberty; but bigotry and ſuperſtition, together with the Inquiſition, prevent the ſubjects of other countries from emigrating to it, and population is far from being encouraged. The pride of the Spaniards will not permit them to cultivate their lands, which are ſome of the fineſt in Europe, nor to apply themſelves to commerce; and notwithſtanding all their riches their country is barren, and the body of the people poor.

Hiſtory informs us, that it has frequently been propoſed in Spain, to cut a canal through the iſthmus of Darien, from Panama to Nombre de Dios, to effect a ready communication between the Atlantic and South ſeas, and thus open a ſtraight paſſage to China and the Eaſt Indies: but the project appears to have been conſidered as chimerical, and treated with ridicule. It cannot indeed be ſuppoſed, that the Spaniards would neglect to furniſh their own country with canals, of which it is really in want, and yet be anxious to improve, by means of ſuch works, a colony, and that a barren mountainous country, at three thouſand miles diſtance.

Spain,

Spain, however, has attempted ſomething in the way of canals, to improve the internal part of the country; but very much is wanted to complete them, and to render them uſeful and profitable; though in any other country in Europe (Turkey and Portugal excepted) ſimilar undertakings would very ſoon have been brought to perfection.

In 1785 the famous canal of Arragon began to juſtify the hopes which had been entertained of it; ſince the reign of Charles V. ſome ſmall veſſels from Tudela arrived at Saragoſſa, where they were received with the moſt lively demonſtrations of joy.

Don Ramon Pignatelli did not think he derogated from the high dignity of an eccleſiaſtic, nor from that of his illuſtrious birth, in devoting his ſtudies to the ſervice of his country: he preſides over this undertaking; which, when accompliſhed, will open a new conveyance to the productions of Arragon, one of the provinces of Spain the moſt favoured by nature, and yet one of the leaſt productive relatively to its extent. Two canals, that of Tauſte, and the Imperial Canal, both of which begin at Navarre, and have the ſame depth of water, run in various windings through Arragon, and by turns recede from or approach the river Ebro, till they at length fall into it. Theſe ſtreams are the ſources of induſtry to all the diſtricts through which they flow, and render their fields fertile by their fructifying waters.

The country or province of Arragon is already planted with thouſands of olive and other trees: the cities and towns, which formerly were condemned to drought and ſcarcity, are now ſupplied with fiſh and water from theſe canals.

The rivers, which, from the north of Navarre and Arragon, formerly emptied their waters into the Ebro, will contribute to the flouriſhing condition of the countries they have hitherto uſeleſsly watered, as ſoon as the Ebro can receive the merchandiſe they bring. This undertaking

has been effected by labours, that deſerve no leſs admiration than that excited by the wonders of the canal of Languedoc. Beſides the dykes, banks, and ſluices, with the larger and ſmaller bridges, which the two canals in their courſe rendered neceſſary, there has been conſtructed in the valley of Riojalon, an aqueduct ſeven hundred and ten fathoms in length, and ſeventeen feet thick at the baſe, in which the little river or canal runs.

Another canal, which makes but very ſlow progreſs, is cut out of the little river Piſuerga, which runs from north to ſouth; the waters of which it was intended ſhould be made to ſupply the canal of Caſtile, projected and begun in the laſt reign. This project was afterwards almoſt abandoned, to the great prejudice of Old Caſtile, which only waits for ſuch an opportunity for the ſale and increaſe of its productions. The canal was to begin at Segovia, and follow the courſe of the river Ereſma, which falls into the Duero, to be continued as far north as Reynoſa, receiving from the little rivers in its paſſage the tribute of their waters. Reynoſa is but twenty leagues from St. Ander; a ſea port where all the merchandiſe exported from Old Caſtile is ſhipped: a road (which will be deſtroyed before the canal is finiſhed) has been made to facilitate a communication by land.

Spain owes to the ſovereigns of the houſe of Bourbon the few roads and canals ſhe poſſeſſes. We have already mentioned the canal of Arragon, and alſo that of Caſtile: the canal of Murcia next claims our attention, the completion of which has been found impracticable: the ſubſcribers, inſtead of the profits which their avidity graſped at, muſt content themſelves with the intereſt that the king pays them.

In the year 1784, the miniſter adopted a project much more brilliant and uſeful than that which he was obliged to abandon. A canal was planned, which, beginning at the foot of the mountains of Guadarrama, near the Eſcurial, ſhould proceed to join the Tagus, afterwards the Guadiana,

Guadiana, and terminate at the Guadalquivir above Anduxar; and which conſequently will give new life and activity to the interior parts of Spain, the leaſt populous and moſt barren parts of the kingdom. A Frenchman of abilities, named Le Maur, gave in the plan, and was preparing to carry it into execution, but died ſoon afterwards. The impulſe, however, was given, the money ſubſcribed, and the eſtimate made, and the undertaking is continued by the ſons of Le Maur, who inherit from their father all his plans, and a portion of his talents.

In May 1785, the bank made a propoſal, the admiſſion of which will find new employment to its funds, and give ſecurity to encouragement: this was to undertake the completion of the canal above mentioned, which begins at the foot of the mountains of Guadarrama. The bank offered to make the neceſſary advances for this great undertaking, upon the ſame conditions on which it received the contract for victualling and clothing the troops; and the propoſal was accepted by government, who immediately employed Le Maur as before-mentioned; nor did the unexpected death of that able engineer ſuſpend the work, it being carried on by his ſons.

Another canal was begun under the adminiſtration of M. De Grimaldi, to join the river Manzanares at the river Tagus: ſcarcely were three leagues of it finiſhed, when want of capital and induſtry ſuſpended the works: the only advantage derived from it is, the produce of a few mills; and this is abſorbed in the repairs of bridges and ſluices, and the ſalaries of the perſons employed. But the activity now given to all the branches of adminiſtration will ſoon have its effect on the canal of Manzanares: the mills upon it are already uſeful to the undertakings of the bank charged with victualling the army; and the canal itſelf will, in a ſhort time, become a part of that, which, as has been already obſerved, is to croſs all the interior parts of Spain.

In 1785, General O'Reilly, governor of Cadiz, employed M. Bour-

 nial,

nial, whom he ſent for from France, to bring freſh water to Cadiz, from ſprings at the diſtance of eleven leagues; but on General O'Reilly's diſgrace the ſcheme was abandoned, although M. Bournial had ſurveyed and taken the levels, and finiſhed the plans; and, to engage the nation to carry it on, had, on opening the ground, found and traced the remains of an old canal or aqueduct, without doubt dug by the Romans for the ſame purpoſe.

The internal parts of Spain are as capable as, if not more ſo than, any country in Europe of receiving the improvements of inland navigation; and there is no country in the world to which they are more neceſſary. The great rivers Ebro, Guadalquivir, Guadiana, Tagus, Duero, and Minho, riſe in the middle of the kingdom, and run into the Ocean and Mediterranean: and there are beſides many others of leſſer note, from which navigable canals might be made to interſect the interior parts of the country, at a very reaſonable expence. The profit of ſuch undertakings would be immenſe, for it will ſcarcely be believed, that even in this enlightened age, the Spaniards carry the products of the interior parts of the country, which chiefly conſiſt of wine and oil, in large leathern bottles, on the backs of mules and aſſes, from one province to another. Grain alſo is conveyed in like manner to different parts of the country, which grow none, although the climate is perhaps the fineſt in the world.

An Engliſhman would ſcarcely be able to contain his indignation to ſee the gifts of Providence ſo abuſed, when very little aſſiſtance from art is required, to complete what nature has ſo abundantly laviſhed. The author of this work was in treaty with Prince Maſſerano, when he was ambaſſador at the Britiſh court, to go to Spain with a number of workmen from England, if they could have obtained permiſſion from government, to make common ſewers throughout the city of Madrid, and pave it after the manner of London, which it is in great want of; and

alſo to ſurvey the country, to improve it with canals: but the war with Spain very ſoon after ſucceeding, the Spaniards having joined the Americans, and acknowledged their independance juſt before application was intended to be made for the permiſſion of the Engliſh government; the ſcheme was rendered abortive.

The kingdom of Spain, according to Uſtariz, contains about ſeven millions and a half of inhabitants, and would ſupport twice that number were it properly cultivated, its manufactures encouraged, and its mines worked. It contained, in the times of the Goths and Moors, between twenty and thirty millions of people. Inconſiderable too as the number of the inhabitants is, yet they are alſo very poor, though they live in a land capable of ſupporting many millions more in plenty, and which, beſides its natural advantages, has prodigious ſums of money poured into it from America.

Savala, in his Treatiſe *del Commercio de las Indas*, computes, that from the year 1492, when America was diſcovered, to 1731, above ſix thouſand millions of pieces of eight in regiſtered gold and ſilver have been imported into Spain, excluſive of far greater ſums unregiſtered. But as theſe remarks may appear ſomewhat foreign to my ſubject, I ſhall proceed, according to my plan, to the canals of England.

CHAP.

CHAP. VII.

Of the Canals of England.—Canal of Caerdyke.—The New River.—The Duke of Bridgewater's Canal, being the firſt navigable Canal made in England.—Difficulties ſurmounted in the Execution of this aſtoniſhing Work.—Account of the Aqueduct by which the Canal is carried over the River Irwell, near Barton Bridge.—Extracts of the Acts, enabling the Duke to cut his Canal.—Utility of this Canal.—Particulars of the Life of the ingenious Mr. Brindley, the Engineer employed by his Grace in this great Work.—Deſcription of the ſubterraneous Paſſage into, and the Inſide of his Grace's Coal Mine at Worſley Mill.—Account of the Surveys for an intended Inland Navigation from Liverpool to Hull.

ENGLAND, in which all the arts and ſciences, commerce, and agriculture eſpecially, flouriſh, is an iſland containing numerous rivers, rendered navigable by art, where they are not ſo by nature. The rivers Thames, Trent, Severn, and Merſey, extend far into the country, and almoſt divide the iſland into four parts: yet, though four of the principal ports of the kingdom, viz. London, Briſtol, Liverpool, and Hull, are commodiouſly ſituated on theſe great rivers, and inceſſantly crowded with innumerable veſſels, laden with the richeſt productions of the different countries of the world, none of theſe great commercial ports had, for a long time, any other communication with each other, than by a tedious and circuitous navigation, or a tireſome and expenſive land-carriage: and though we had, ſo near us as Holland and France, ſeveral examples of canals for inland navigation, executed and attended with the greateſt advantages, becauſe by them a ſale was procured for a variety of productions

productions of the internal parts of thoſe countries, which were before uſeleſs, or only conſumed near the place of their growth; yet neither government, nor any public-ſpirited individual, attempted any works of that nature in England.

To the inſular ſituation of Great Britain, and its numerous large and navigable rivers, we may no doubt juſtly attribute the long neglect of canal navigations in this country. A private undertaking of that kind was at length begun, by a noble duke, during the continuance of an expenſive but glorious war, in which conqueſt crowned in the moſt ſignal manner almoſt every effort of the Britiſh arms.

Peace ſucceeding, a full tide of commerce, and its concomitant, wealth, poured into England from every quarter of the world; and new ſources of trade and riches being opened, excited a general emulation among our manufacturers to rival and ſurpaſs, if poſſible, thoſe of other countries. How far they have ſucceeded, and are daily ſucceeding, is not for me to determine.

The ſucceſs of the noble individual above-mentioned, who planned and began the firſt canal for inland navigation in this country, by drawing a mine of wealth from the bowels of a mountain, which had been hitherto totally uſeleſs, and of no value, awakened a general ardour for ſimilar improvements among the land owners, farmers, merchants, and manufacturers of the kingdom; and although there was neither a Louis XIV. nor a Colbert to encourage, there wanted not engineers equal to Riquet; and England, though late, began to rouſe from her lethargic ſlumber, and pour forth the riches which ſhe poſſeſſed in her inland provinces; to effect which her navigable rivers alone, however numerous and large, were found to be inadequate.

In treating of the canals of England, *Caerdyke*, if it may be called a canal, ought perhaps firſt to be mentioned, as it is the moſt ancient; but

whether it was intended for the purpoſes of inland navigation, it is impoſſible that I ſhould determine, different authors having aſſigned to it different uſes: but as it is cut from the river Nyne, a little below Peterborough, into the river Witham, three miles below Lincoln, there is great reaſon to ſuppoſe that it was intended to join thoſe two rivers. It is probably a work of the Romans, and was forty miles in length, though it is now almoſt filled up, and muſt have been very deep. Some authors, however, ſuppoſe it to have been cut by the Danes. Moreton will have it to have been made under the Emperor Domitian; and urns and medals have been dug up near it, which ſeem to confirm this opinion.

The canal for ſupplying London with water, commonly called the *New River*, was projected and begun by Mr. (afterwards Sir Hugh) Middleton, in the year 1608, and finiſhed in five years. This canal begins near Ware in Hertfordſhire, and takes a courſe of ſixty miles before it reaches the grand ciſtern at Iſlington, which ſupplies the ſeveral pipes that convey the water to the city and parts adjacent. In ſome places it is thirty feet deep; and near Hornſey it was formerly conveyed over a valley, between two hills, by means of a wooden trough ſupported by wooden arches, and about twenty-three feet in height; but of late years the courſe has been changed, and the river embanked. In other places, meandering round hillocks and riſing grounds, it is confined on one ſide by the ſolid hill, and on the other by large thick banks, piled, or large mounds.

The different rivers which have been made navigable by art above the tide-ways, do not come within my plan: the firſt canal, therefore, which claims attention as being the firſt public work of the kind executed in England, although completed at the expence of a private individual, is that cut by his Grace the Duke of Bridgewater, in whoſe praiſe it would be unpardonable to be ſilent, who, at an age too often ſpent in diſſipation by our young nobility, applied his attention to uſeful

ful objects, and had the ſpirit to hazard ſo great a part of his fortune in an undertaking worthy the purſuit of a prince, which, however, has ultimately proved highly profitable to himſelf, and beneficial to his country. When the influence of exalted rank and large poſſeſſions is thus nobly and uſefully exerted, they confer additional luſtre on the poſſeſſors, who then juſtly merit being ranked among the firſt citizens of the community.

His grace has the honour, as well as pleaſure, of having firſt introduced inland navigation into this kingdom; the utility of which is ſo ſenſibly known and felt, that it is at length, to the profit and happineſs of this country, encouraged by the nobility and land owners in many of the interior parts of the country. It would alſo be unpardonable to withhold the praiſe ſo juſtly due to the penetration of this illuſtrious nobleman, for having called forth the hidden talents of a Brindley; talents, which, but for his grace, would have been utterly loſt to his country.

In 1758 and 1759, his grace the duke of Bridgewater, after obtaining two acts of parliament for that purpoſe, projected, began, and executed, under the direction of his engineer, Mr. Brindley, his firſt canal, which was deſigned for conveying coals from a mine (or more properly a mountain) on his grace's eſtate to Mancheſter, but has ſince been applied to many other uſeful purpoſes of inland navigation. This canal begins at a place called Worſley Mill, about ſeven computed miles from Mancheſter, where the duke has cut a baſin capable of holding, not only all his boats, but a great body of water which ſerves as a reſervoir, or head of his navigation. The canal runs through a hill, by a ſubterraneous paſſage, big enough for the admiſſion of long flat-bottomed boats, which are towed by hand-rails on each ſide, near three quarters of a mile under ground to the coal-works. There the paſſage divides into two channels; one of which goes five hundred yards to the right, and the other as many yards to the left, and both may be continued at pleaſure.

The paſſage is in ſome places cut through the ſolid rock, and in others arched over with brick. Air funnels, ſome of which are thirty-ſeven yards perpendicular, are cut at certain diſtances through the rock to the top of the hill. The arch at the entrance is about ſix feet wide, and about five feet high above the ſurface of the water. It widens within, ſo that in ſome places the boats may paſs each other; and at the pit is ten feet wide. The coals are brought to this paſſage or canal in little low waggons, that hold nearly a ton each; and as the work is on the deſcent, are eaſily puſhed or pulled along, by a man on a railed way, to a ſtage over the canal, and then ſhot into one of the boats, each of which holds ſeven or eight tons. They then, by means of the rails, are drawn out by one man to the baſin at the mouth (a boy of ſeventeen years of age has worked twenty-one of theſe boats at a time, which at ſeven tons each, the loweſt quantity is one hundred forty-ſeven tons brought out of the pit to the baſin at the entrance); then five or ſix of them are linked together, and drawn along the canal by a ſingle horſe, or two mules, on the banks or towing-paths: it is there broad enough for the barges to paſs or go abreaſt; and in the courſe of nine miles (a circuit of two miles being made in ſeeking a level) the canal reaches Mancheſter. The canal is raiſed over public roads by means of arches; and where it is too low for a carriage to go under, the road is lowered with a gentle deſcent, and aſcends on the other ſide: it is thus carried over the navigable river Irwell, and nearly forty feet above it; ſo that large veſſels in full ſail paſs under the canal as under a large lofty bridge, whilſt the duke's barges are at the ſame time paſſing over them.

It may be proper here particularly to deſcribe the noble aqueduct which carries this canal over the river Irwell. This ſtupendous work was begun at a place called Worſley Mill, about ſeven miles from Mancheſter, where, at the foot of a large mountain, which proves to be compoſed of coal, the duke has cut a baſin capable of containing all his boats, and a great body of water, which ſerves as a reſervoir or head to his navigation. At Barton-bridge, three miles from the baſin, begins

begins this aqueduct, which, for upwards of two hundred yards, conveys the canal acroſs a valley; and alſo above forty feet above the navigable river Irwell: there are alſo ſtops at each end, that may occaſionally be drawn up, and let off the whole body of water, which is eaſily done by drawing a plug, and diſcharging the water into the Irwell, through a wooden tube. There are many of theſe ſtops or flood-gates ſo conſtructed, that ſhould any of the banks give way, and thereby occaſion a current, they will riſe by that motion, and prevent the damage that would otherwiſe happen by the waters overflowing the country.

This bridge unites the Lancaſhire and Cheſhire parts of the duke's navigation; it is carried over the meadows on each ſide the river Merſey, and quite acroſs Sale moor, at incredible labour and expence. Mr. Brindley cauſed trenches firſt to be made, and then placed deal balks in an upright poſition, from thirty to thirty-ſix feet long, backing and ſupporting them on the outſide with other balks laid lengthways, and in rows, and ſcrewed faſt together, driving in ſome thouſands of oak piles of different lengths between them; and on the front ſide he threw the clay and earth, and rammed them well together to form his navigable canal. After thus finiſhing forty yards, he removed the balks and proceeded again as before, where it was deſigned to continue the canal.

The bridge for the aqueduct over the river Irwell, is built all of ſtone of great ſtrength and thickneſs. Every ſtone in the faces has five ſquare beds and ſides, well jointed and cramped with iron cramps. There ar e three arches over the river Irwell, which, with their piers, are all of hewn ſtone, of the largeſt dimenſions, and cramped in the ſame manner as the others. The centre arch is ſixty-three feet wide, and thirty-eight feet high above the water, and will admit the largeſt barges, which navigate the Irwell, to go through with maſt and ſails ſtanding. See the annexed plate.

At Stretford, three miles from hence, was the caiſſon, forty yards

long by thirty-two broad. Open bottomed boats were employed to carry and diſcharge loads of earth, and thereby raiſe the ground where the level required it: theſe were employed in the caiſſons, as the ground they paſſed over lay ſixteen or eighteen feet below the ſurface of the canal: they carried about eighteen tons, which, with great eaſe, was ſhot out in an inſtant where wanted.

At Combroke, three miles further, is a circular wear to raiſe the water of the canal to its proper height: the ſurplus flows over the nave of a circle in the middle of the wear, built of ſtone, into a well, and by a ſubterraneous tunnel is conveyed to its uſual channel: there is alſo a machine to waſh the ſlack, which is worked by water.

In order to feed that end of the navigation which is near Mancheſter, Mr. Brindley raiſed, and as it were ſwallowed up, the river Medlock, by a large beautiful wear, compoſed of ſix ſegments of a circle, built of ſquare ſtone, bedded in terras, and every ſtone cramped with iron: the whole circumference is three hundred and ſixty-ſix yards, with a circular nave of ſtone in the middle. The water, when at a proper height to ſupply the navigation, flows over the nave, and down the well as at Combroke; but in order to keep the bed dry during the time the workmen were building this wear, he turned off the greater part of the water by a cut through the rock, and invented an engine, which he called a ſpoon, and which he worked, at the end of a lever, by a horſe. When this ſpoon dips into the water, a kind of flap door, made of leather, is preſſed open, and admits the water till full; and on being weighed up the preſſure of the water within cloſes the door, and, as the lever riſes, it runs off into a channel cut at the end of the ſpoon handle.

From the wharf at this place, the poor of Mancheſter fetch great quantities of coals in wheel-barrows, at three-pence half-penny a hundred weight of ſeven ſcore, which is not one half the price which was before paid for that neceſſary article. But Mr. Brindley, to remove the inconvenience

inconvenience of carrying them up Caſtle-hill, has driven up a large tunnel through the centre of this hill, into which the barges are introduced; and by a crane, which is worked by a box water-wheel of thirty feet diameter, and four feet four inches wide, they are landed cloſe to the town. This branch of the canal to Mancheſter is very near ten miles in length, and has been executed, on an average, at the expence of a thouſand guineas a mile.

At Langford-bridge, the canal turns away to the right, and croſſing the river Merſey, paſſes near Altringham, Dunham, Grapenhall, and Haulton, into the tide-way of the river Merſey at Runcom Gap, where his grace's barges can come into his canal from Liverpool at low water.

The ingenuity and contrivance diſplayed through the whole work was wonderful. The ſmiths' forges, the carpenters' and maſons' workſhops, were covered barges, which floated on the canal, and followed the work from place to place; by which means there was very little or no hindrance of buſineſs from accidents; and as the duke had all his materials in his poſſeſſion, timber, ſtone, and lime for mortar, and coals from his own eſtates, and ready at hand, he has been at little expence except labour. It is alſo to be obſerved, that the duke has made the refuſe of one work ſerve for the conſtruction of another. Thus the ſtones which were dug up to form the baſin for the boats at the foot of the mountain, as well as thoſe taken out of the rock to make the ſubterraneous paſſage, were hewn into different forms, ſhapes, and dimenſions, to build bridges over the rivers, brooks, or highways, or arches to ſupport the aqueduct. The clay, gravel, and other earths, taken up to preſerve the level at one place, are carried down the canal to raiſe the land in another, or reſerved to make bricks for other uſes.

Here grandeur, elegance, and economy, are happily united. At firſt view it would ſeem, that the work was ſolely intended to excite aſtoniſhment. But, on a cloſer inſpection, there is to be found nothing

but what is proper and neceſſary, and the whole has been finiſhed at an expence no ways adequate to the undertaking: in ſhort, the work is truly admirable, and will be a ſtanding monument of the good taſte, public ſpirit, and economy of the duke of Bridgewater, to the end of time.

Before the duke began his canal, the price of water carriage by the old navigation on the rivers Merſey and Irwell, from Liverpool to Mancheſter, was twelve ſhillings the ton, and from Warrington to Mancheſter, ten ſhillings the ton. Land carriage was forty ſhillings the ton, and not leſs than two thouſand tons were yearly carried on an average. Coals at Mancheſter were retailed to the poor at ſeven-pence per hundred weight, and often dearer. The duke, by his navigation from Liverpool to Mancheſter, carries for only ſix ſhillings a ton, and in as ſhort a time, and with as certain delivery as if by land carriage, becauſe he is able, at the loweſt neap tides, to come into or go out of his canal at Runcom Gap to Liverpool, which he could not do if he had gone in at the Hempſtones, as was at firſt intended; conſequently one half is ſaved to the public of the old water carriage, and almoſt ſix parts in ſeven of the land carriage. Coals alſo are delivered at Mancheſter, ſeven ſcore to the hundred weight, for three-pence half-penny.

I cannot give a better deſcription of the duke's canal, and his intentions to ſerve the public, than by a ſhort extract of the acts of parliament which he obtained for that purpoſe, adding a few obſervations, as I proceed, by way of explanation.

In the ſeſſion of parliament of the years 1758 and 1759, his grace the duke of Bridgewater obtained an act, for enabling him to cut a navigable canal from Worſley to Salford, near Mancheſter, and to carry the ſame to or near Hollin Ferry, in the county of Lancaſter.

Soon after the paſſing of this act his grace began his works, and made

made a navigable canal from Worſley Mill to the public highway leading from Mancheſter to Warrington; but it being then diſcovered, that the navigation would be more beneficial both to his grace and the public, if carried over the river Irwell, near Barton-bridge to Mancheſter, his grace applied again to parliament to vary the courſe of his canal accordingly, and to extend a ſide-branch to Longford-bridge, in the townſhip of Stretford, and he obtained an act for that purpoſe.

The making a navigable canal over the river Irwell, and filling up the great hollow ground on the north ſide of this river, was looked upon as a very arduous undertaking, and, by moſt perſons who viewed the chaſms, thought to be impracticable: but his grace being well ſupplied with materials from his own eſtate, has completed this as well as the other difficult parts of his great undertaking.

By the firſt act, a rate or duty not exceeding two ſhillings and ſixpence per ton was granted to the duke as a recompenſe, for the charges of making and completing his navigation; and the ſecond act varies the courſe of the canal, and extends it, but makes no alteration with reſpect to tonnage.

The duke, upon a farther ſurvey, and taking levels, found it practicable to extend his canal from Longford-bridge, by Dunham, to fall into the river Merſey, at or near a place called the Hempſtones, below Bank-quay, ſo as to bring veſſels into his canal at the loweſt neap tides; and having obtained a third act for that purpoſe, undertakes this at his own expence, without any addition or increaſe of tonnage.

" If navigations are advantageous to a country, that advantage muſt
" increaſe in proportion to their extent, and the intercourſe and con-
" nections with the parts with which they communicate; and allowing
" this to be a fact, there certainly cannot be a more intereſting con-
" ſideration, than the facilitating the conveyance of goods and mer-

" chandiſe between the great trading towns of Mancheſter and Liver-
" pool."

The firſt act recites in the preamble, that the perſons named in the act 10 Geo. II. intituled " An act for making navigable the river or brook, called Worſley Brook, from Worſley Mill, in the townſhip of Worſley, in the county palatine of Lancaſter, to the river Irwell, in the ſaid county," have hitherto neglected to carry the ſaid act into execution, &c. and that a cut or canal may be made from a certain place in the townſhip of Salford, &c. near Mancheſter, in the ſaid county of Lancaſter, to or near Worſley Mill aforeſaid, and Middlewood, in the manor of Worſley, and to or near Hollin Ferry, in the ſame county, and ſupplied with water from the ſaid Worſley Brook, and other brooks and places near, &c. &c. &c. ſufficient for floating or carrying of boats and other veſſels of conſiderable burthen, by which the conveyance of coals, timber, ſtone, manure, goods, wares, and merchandiſes, to and from Mancheſter and Salford, &c. &c. will be greatly facilitated, &c. &c. The act impowers his grace the duke of Bridgewater, his heirs, &c. &c. to make and maintain the ſaid cut or canal, at his or their own proper coſts and charges, to enter lands, dig, and remove obſtructions, and to make towing-paths on the ſides of his canal, gutters, and water-courſes, locks, ſluices, &c. &c. weighing-beams, bridges, arches, &c. and ſet up poſts, rails, &c. firſt making ſatisfaction to the owners of or perſons intereſted in ſuch lands or grounds, &c. &c. No water to be taken out of the river Irwell into his cut or canal. Power is given to ſurvey and ſet out lands, and all perſons impowered to convey ſuch lands to the duke. But the lands ſo to be ſet out ſhall not exceed ſixteen yards in breadth, except, &c. &c. No wharfs to be made between Salford and Barton-bridge, without the conſent of the owners of the lands. Commiſſioners are named to determine differences, &c. between the duke and the proprietors of lands, &c. &c. to ſettle recompenſes. If parties will not ſubmit to their determination (i. e. of any ſeven of them), refuſe to accept the purchaſe money, &c. or to treat, or ſhall not agree,

agree, juries may be impannelled to aſſeſs the purchaſe moneys, &c. Penalties are 20l. for the ſheriff or coroner, 5l. for every juryman and perſon ſummoned who ſhall make default, to be levied by diſtreſs and ſale of goods. The commiſſioners may ſettle the proportions of the moneys to be paid to the ſeveral perſons intereſted, with an exception. Determinations, verdicts, and judgments, to be kept by the clerk of the peace; and if the ſum given by the jury be greater than that ſettled by the commiſſioners, then the duke to pay the expence of ſuch jury. Upon the payment of the ſums aſſeſſed, the lands, &c. to veſt in the duke; and in default of payment, the ſums aſſeſſed to be recovered with full coſts of ſuit by action of debt, againſt the ſaid duke, his heirs, aſſigns, &c. &c. wherein no eſſoign, protection, privilege, wager of law, or more than one imparlance ſhall be allowed. If coſts and damages are not paid in three months, to be levied on the duke's coals, boats, &c. The works done in purſuance of this act not to be ſubject to the ſewer laws. The coals from the duke's mines not to be ſold for more than four-pence per hundred weight at Manchester or Salford. Qualification for a commiſſioner or juryman 50l. per ann. freehold, or 1000l. perſonal eſtate after payment of juſt debts. The duke to fence in the towing-paths from the adjoining lands, erect bridges, &c. or on neglect the commiſſioners to do it, and levy the charges. Houſes not to be taken down, or timber cut, &c. except ſuch as are aſcertained for the purpoſes of the act. The next clauſes relate to the election of the commiſſioners in the room of ſuch as die or refuſe to act, and the regulation of their meetings. Purchaſe moneys for lands, &c. in ſtrict ſettlement to be placed out in government's funds, &c. &c. Felony for any perſon to deſtroy or damage the works. The writings in purſuance of this act to be exempted from the ſtamp duties, and no proceeding taken in purſuance thereof to be quaſhed for want of form. The navigation to be free upon paying the tolls. The duke, &c. impowered to fix the tonnage rates, which are not to exceed two ſhillings and ſix-pence per ton; and rates neglected to be paid may be ſued for or levied, and a farther allowance is to be made for goods remaining on

the wharfs above twenty-four hours. The owners of lands, &c. to have free liberty to carry dung by the canal to their lands. Rights of lords of manors ſaved; and owners of veſſels to be reſponſible for their ſervants. Veſſels lying ſo as to obſtruct the navigation to be removed, and ſunk veſſels to be weighed up. The next clauſes direct the manner of collecting and aſcertaining the tonnage rates, the management upon differences, &c. Any perſon throwing ballaſt into the canal, to forfeit twenty ſhillings. Perſons giving falſe evidence in the premiſes, to be proſecuted and puniſhed as perſons guilty of wilful and corrupt perjury. The proceedings of the commiſſioners to be regiſtered, and a clerk appointed. The next clauſe directs the recovery and application of penalties. Perſons aggrieved may appeal to the quarter ſeſſions for the county of Lancaſter. The commiſſioners may act as juſtices. The former act mentioned in the preamble is repealed: actions brought on this act muſt be commenced within ſix calendar months after the offence: the party convicted to pay treble coſts, and the act to be deemed a public act.

The ſecond act enables his grace, at his own expence, to make a navigable cut or canal from or near Worſley Mill, over the river Irwell, to the town of Mancheſter, and to, or near, Longford-bridge, in the townſhip of Stretford, in Lancaſhire. The powers of the former act are extended to this, but the breadth of the canal and towing-paths not to be limited. His grace is impowered to make arches over the river Irwell, at Barton-bridge: but the navigation of the ſaid river is not to be obſtructed, provided the proprietors of the navigation of the ſaid river do not open locks for longer time than is neceſſary. The canal, arches, &c. to be the property of the duke. The duke's works not to be carried nearer the buildings of Mr. Lloyd, of Hulme near Mancheſter, than thirty yards, &c. Nor is he to erect wharfs, &c. in Quay-ſtreet, Mancheſter, or upon Mr. Byrom's lands, except as excepted. Tolls to be paid on Croſford-bridge road, ſo as the ſame does not extend to a double charge; and coals which have been navigated on the canal,

ſhall pay at the turnpikes only one moiety of their tolls or duties, granted by the act 24 Geo. II. at ſuch turnpikes as are erected by virtue of that act. The truſtees of that road may compound with the duke for the carriage of coals thereon. The duke to maintain the bridges over the canal, where it croſſes the turnpike road. The lords of manors rights are reſerved, and the act declared a public act.

The third act enables the duke to make a navigable cut or canal from Longford-bridge, in the townſhip of Stretford, in Lancaſhire, to the river Merſey, at a place called the Hempſtones, in the townſhip of Halton, in the county of Cheſter. The two former acts are recited; and as the canal is capable of being extended, &c. (as above) the duke is impowered to extend it at his own proper coſts and charges, to remove obſtructions, and to make arches and other works on the river Merſey, as alſo bridges, roads, &c. Commiſſioners are named, their power ſettled, and their meetings regulated as in the firſt act. Flour, &c. which has paid toll before grinding, not to pay it again. Perſons evading the payment of the toll forfeit forty ſhillings for every offence, to be recovered as by the firſt act. No corn-mills to be erected on the canal or towing-paths. The duke not to divert certain water-courſes or ſtreams of water therein mentioned; and a recompenſe to be made for uſing ancient ſtreams, which communicated with the rivers Merſey and Irwell. The next clauſes direct the application of forfeitures, and give the ſame power to the juſtices of Cheſhire, as were by the firſt act given to thoſe of Lancaſhire. The tonnage duty to be taken not to exceed two ſhillings and ſix-pence per ton, and the ſame may be paid for certain kinds of commodities mentioned; and no higher duty to be taken upon the navigation than is authoriſed by the former acts. No toll to be taken for manure, or for ſtones to repair the highways. The duke to make weirs before the boats paſs through the locks. The next clauſe directs, that drains, &c. ſhall be made into the canal to convey the water from the lands adjoining, and in what manner they ſhall be maintained. The next impowers bodies politic, &c. to ſell or con-

vey in exchange lands for the uſe of the navigation. Trees not to be planted, nor buildings erected, on towing-paths, except as excepted, without conſent. The next clauſe impowers owners of lands near the navigation to make wharfs, quays, &c. on their own lands. The next limits the breadth of the canal and towing-paths, as in the firſt act. No more than ſix ſhillings per ton to be taken for the carriage of goods between Mancheſter and Liverpool. Lands to revert to the original proprietors, if the navigation is not made through them in ten years, or if made and diſcontinued five years. The powers of the former act extended to this. The works not to be carried through Lord Stamford's park without his conſent, nor nearer the houſe of the Rev. Mr. Halſtead, in Lym, than fifty yards. In an action in any court on this act, no eſſoign, protection, &c. &c. nor more than one imparlance ſhall be allowed, and the act to be deemed a public act.

By the above abſtracts, it will appear how cautiouſly the legiſlature guarded againſt the infringements of public or private rights, or treſpaſſing upon private property. The acts are explicit, and full proviſion is made againſt any difference that could at firſt, or may hereafter ariſe between the duke and other perſons concerned.

The above navigation is more than twenty-nine miles in length: it falls ninety-five feet, and was finiſhed in five years. The utility and profits of it were ſoon perceived by a diſcerning and trading people, and a number of applications immediately made to Parliament for different acts, as was expected, to join the four great trading cities, London, Briſtol, Liverpool, and Hull, by an inland navigation, with branches to different manufacturing towns, as I ſhall more particularly relate hereafter.

I cannot give a true character of the duke of Bridgewater, and that of his celebrated engineer, nor ſet forth the great utility of their wonderful undertaking in more lively colours, than by giving a literal extract from a treatiſe on that ſubject, written by a gentleman well known for his great

great abilities as a ſtateſman, as well as his great knowledge of the mercantile world and landed intereſt. And if I ſhould be deemed prolix, I hope I ſhall be excuſed, from my deſire to pleaſe and be uſeful to my readers; for ſuch a theme can ſcarcely ever be exhauſted, nor ought ſuch a ſtupendous work to be treated merely as a common occurrence or undertaking.

This gentleman begins :—" Nor can I enough admire and commend " that noble ſpirit and good ſenſe, with which his grace the duke of " Bridgewater has ſo lately proved to the world, that the advantages of " an inland navigation are only to be obtained by carrying and cutting " level canals of dead water from one town to another, which admit " not, nor are ſubject to, one half of the inconveniences which the late " method of making rivers navigable, by pounding up the water by " large and very expenſive locks, is of neceſſity expoſed to from the " force of the ſtream and floods. Nor can I help admiring the won- " derful and great natural genius of Mr. James Brindley, who has " planned the ſame, and perfected theſe canals, ſurmounting, with his " own genius, and his grace's money and ſpirit, things that might have " been thought by nine hundred out of a thouſand people, almoſt inſur- " mountable difficulties. The breadth of theſe canals is about eight " yards wide, and four feet deep ; they are chiefly made in a ſtraight " line over a flat country. His grace's firſt attempt was in order to " carry coals from his works to ſupply Mancheſter, and other towns in " Cheſhire and Lancaſhire : the laſt act of parliament enabled his grace " to proceed to Altringham, in Cheſhire, with which undertaking they " are in great forwardneſs (1766). They have now completed about " ſeventeen miles, at about ſeven hundred pounds a mile, excluſive of the " expence of bridges, &c. The duke has built a very handſome bridge " over the river Irwell, in order to convey his canal acroſs: it is near " fifty feet high, and five hundred yards long, with three large arches ; " the main arch being ſixty-three feet wide. There is a road on each " ſide the canal over the bridge for the horſes to draw the veſſels along ;

" and

" and indeed it is no unpleaſant ſight to ſee one veſſel, near fifty feet " higher than another, ſailing over the bridge at the ſame time that " another is ſailing near fifty feet below. There is one place where " the canal goes over the highway from Mancheſter to Eccleſton. But " what is moſt ingenious, I think, is the invention of flood-gates, that " are under water, and croſs the canal: they lie almoſt horizontally, a " ſmall matter inclining to each other, at a quarter of a mile diſtance, in " order that, if any part of the canal ſhould break its banks, the draught of " the water ruſhing towards the breach may draw the two flood-gates " up; by which means no more water will be loſt out of the canal than is " contained between the two flood-gates; and this, upon ſtopping the " breach, is eaſily reſtored, upon letting the gates down again, from the " adjacent part. In ſhort, the principle upon which the whole is formed, " is a determined and fixed reſolution to carry the level on through all " difficulties; which plainly appears in that great and moſt amazing " bank of earth, which has been carried acroſs Stretford meadows, and " which is nine hundred yards long, ſeventeen feet high, and an " hundred and twelve feet in breadth at bottom. Upon the top of this " they have carried the canal, eight yards broad, four feet deep; and " one towing-path on each ſide, ten feet broad. After this difficulty, I " ſhould think nothing too much for money to do, joined with a tolera- " ble judgment, and ſome ingenuity. I cannot tell what theſe canals, " &c. have coſt the duke; and I ſuppoſe the world will never know, " but by report: one may compute one hundred thouſand pounds or " upwards; which is not only the greateſt undertaking that ever was " executed by any one ſubject of this nation, but I may add of all the " world.

" I have now ſhewn, I hope, that an inland navigation may be made " by cutting canals through the lands, much eaſier and better than " pounding up the rapid current of a river by locks. I ſhall, therefore, " now proceed upon that principle and plan, and make the following " propoſal to the merchants of Briſtol, Liverpool, and Hull, and the " intermediate

" intermediate inhabitants, as well as to the great council of the na-
" tion."

Yet notwithſtanding the duke's undertaking was accompliſhed to the ſatisfaction of every beholder, and the difference in favour of canal navigation contraſted to that of a river was never more exemplified, nor appeared to more full and ſtriking advantage than at Barton-bridge, in Lancaſhire, where one may ſee, at the ſame time, ſeven or eight ſtout fellows labouring like ſlaves to drag a boat ſlowly up the river Irwell, and one horſe or mule, or ſometimes two men at moſt, drawing five or ſix of the duke's barges, linked together, at a great rate upon the canal, which is carried over the river at this place like a magnificent Roman aqueduct; and notwithſtanding the above gentleman's treatiſe was publiſhed in 1766, which convinced not only nine hundred out of a thouſand, but nine hundred and ninety-nine, that canal navigation by ſtill water was the beſt, and experience tells us the moſt uſeful; yet, I ſay, we find in 1768 an advocate for river navigation, even after Mr. Smeaton had ſurveyed and delivered in his eſtimates to join the Forth and Clyde, whoſe objections I ſhall conſider and particularize hereafter.

I cannot take leave of the duke of Bridgewater with any propriety, without mentioning a few of thoſe leading particulars, which prove the great depth of the duke's underſtanding, and the well-placed confidence he repoſed in Mr. Brindley, who will be admired by ſucceeding generations. For it muſt be obſerved, that the duke had no facts performed, no demonſtrations to revert to, nor any copy to follow to ſet himſelf right: but, actuated by his own diſcernment, and guided by the genius of his faithful Brindley, he conſented to become the original, and ſet an illuſtrious example for others to follow. Mr. Brindley I muſt mention once more, who was his grace's principal engineer, and one of thoſe geniuſes which nature ſometimes rears by her own force, and brings to maturity without the neceſſity of cultivation. His whole plan was admirable, and ſo well concerted, that he was never at a loſs; for,

for, if any difficulty aroſe, he removed it with a facility that appeared like inſpiration, and that without the leaſt appearance of vanity or oſtentation; for, being without education, he too well knew his inferiority in that point; and having no ſiniſter ends to gratify, no contracted notions and ideas, nor jealouſy of rivals, he concealed not his methods of proceeding, nor aſked or ſolicited patents for the ſole uſe of machines, which he invented and expoſed to public view. His method of draining coal-pits by a fire engine, conſtructed at an expence not exceeding one hundred and fifty pounds, which no one before knew how to make for leſs than five hundred, is a beneficial improvement to the public, which is indebted to him for the invention; nor muſt I omit a mill near the mouth of the ſubterraneous paſſage, and which, though an over-ſhot mill, is ſo well contrived as to work three pair of grinding-ſtones for corn, a dreſſing or boulting mill, and a machine for ſifting ſand and compounding mortar. The mortar is made by a large ſtone laid horizontally, and turned by a cog wheel underneath it: this ſtone on which the mortar is laid turns in its courſe two other ſtones, that are placed upon it obliquely, and by their weight and friction work the mortar underneath, which is tempered and taken off by a man or ſtout lad employed for that purpoſe.

He alſo has invented portable cranes, of uncommon conſtruction, to draw ſtone out of the quarry by callipers. His water-bellows, at the mouth of the cavern, equally deſerve notice. Theſe conſiſt only of the body of a tree forming a hollow cylinder ſtanding upright; upon which a wooden baſin is fixed in the form of a funnel, which receives a current of water from the higher ground: this water falls into the cylinder, iſſues out at the bottom of it, and carries a quantity of air, which is received into tin pipes, and forced into the inmoſt receſſes of the coal-pits, where it rarifies the body of thick air, which would otherwiſe prevent the workmen from exiſting on the ſpot where the coals are dug. Numerous other machines and contrivances have been invented by Mr. Brindley, and all upon the moſt plain and ſimple conſtruction, all tending

tending to ſave great expence and trouble: and here it may not be improper to inſert ſome particulars of the life of this extraordinary mechanic, extracted from the *Biographia Britannica*.

Mr. JAMES BRINDLEY, a man of a moſt uncommon genius for mechanical inventions, and who particularly excelled in planning and conducting inland navigations, was born at Tunſted, in the pariſh of Wormhill, and county of Derby, in the year 1716. His parents diſſipated away the little freehold they were poſſeſſed of, and young Brindley was totally neglected in education, and in his earlieſt part of life contributed to their ſupport, and till he was ſeventeen years of age was employed in thoſe light kinds of labour which are uſually aſſigned in country places to the children of the poor. At this period of his life he bound himſelf apprentice to one Bennet, a mill-wright, near Macclesfield in Cheſhire, and became very expert in the buſineſs: he quickly diſcovered a ſtrong attachment to the mechanic arts in general: in the early part of his apprenticeſhip he was often left for whole weeks together by his maſter, without any previous inſtructions, who was often aſtoniſhed at the improvements he had introduced into the mill-wright buſineſs; and the millers, wherever he was employed, always choſe him in preference to his maſter, or any other workman.

It may not be amiſs to mention a ſingular inſtance of our young mechanic's active and earneſt attention to the improvement of mill-work. His maſter having been employed to build an engine paper-mill, which was the firſt of the kind that had been attempted in thoſe parts, went to ſee one of them at work, as a model to copy after. But notwithſtanding this, when he had begun to build the mill, and prepare the wheels, the people of the neighbourhood were informed by a mill-wright, who happened to travel that road, that Mr. Bennet was throwing his employer's money away, and could not complete what he had undertaken. Mr. Brindley, hearing of this report, was reſolved to ſee the mill intended to be copied: accordingly, without mentioning his

intentions, he ſet out on a Saturday evening, after working the day, travelled fifty miles on foot, took a view of the mill, and returned back in time for his work on Monday morning; informed Mr. Bennet wherein he had been deficient, and completed the engine to the entire ſatisfaction of the proprietors. Beſides this, he made a conſiderable improvement in the preſs-paper.

Mr. Brindley engaged in the mill buſineſs on his own account, and, by many uſeful inventions and contrivances, advanced it to a higher degree of perfection than it had ever attained. By degrees his fame began to ſpread itſelf wider in the country, and his genius was no longer confined to the particular branch of a mill-wright. In the year 1752 he erected a very extraordinary water-engine at Clifton, in Lancaſhire, for the purpoſe of draining ſome coal-mines, which before were worked at an enormous expence. The water for the uſe of this engine was brought out of the river Irwell by a ſubterraneous tunnel, ſix hundred yards in length, carried through a rock, and the wheel was fixed thirty feet below the ſurface of the ground. Mr. Brindley's ſuperior ſkill in mechanics being now well known in that part of the kingdom, his reputation reached the metropolis, and he was employed by N. Patterſon, Eſq. of London, and ſome other gentlemen, in 1755, to execute the larger wheels for a new ſilk-mill, at Congleton in Cheſhire. The execution of the ſmaller wheels, and of the more complex part of the machinery, was committed to another perſon, who had the ſuperintendency of the whole; but who was not, however, equal to the undertaking, and confeſſed himſelf unable to complete it. The proprietors were greatly alarmed, and called in the aſſiſtance of Mr. Brindley, but ſtill left the chief management to the former engineer, who refuſed to let him ſee the whole model, and affected to treat him as a common mechanic. Mr. Brindley, who, in the conſcioufneſs of genius, felt his own ſuperiority to the man who thus aſſumed an aſcendancy over him, would not ſubmit to ſuch unworthy treatment. He told the proprietors, that if they would let him know what was the effect that they wiſhed

wiſhed to have produced, and would permit him to perform the buſineſs in his own way, he would engage to finiſh the mill to their ſatisfaction. This aſſurance, joined with the knowledge they had of his ability and integrity, induced them to truſt the completion of the mill ſolely to his care; and he accompliſhed that very curious and complex piece of machinery, in a manner far ſuperior to the expectation of his employers, by conſtructions of many new and uſeful improvements; particularly one for winding the ſilk upon the bobbins equally, and not in wreaths; and another for ſtopping, in an inſtant, not only the whole of this extenſive ſyſtem, throughout its various and numerous apartments, but any part of it individually. He invented likewiſe machines for making all the tooth and pinion wheels of the different engines. Theſe wheels had hitherto been cut by hand, with great labour. But by means of Mr. Brindley's machines, as much work could be performed in one day as had heretofore required fourteen. The potteries in Staffordſhire were alſo much indebted to him for additions in their mills, for grinding flint ſtones with more facility. In the year 1756 Mr. Brindley undertook to erect a ſteam engine, near Newcaſtle-under-Line, upon a new plan: the boiler of it was made with brick and ſtone inſtead of iron, and the water was heated by fire-flues of a peculiar conſtruction, by which contrivances the conſumption of fuel, neceſſary for working a ſteam engine, was reduced to one half. He introduced likewiſe into this engine cylinders of wood made in the manner of coopers' ware, inſtead of iron ones; the former being not only cheaper, but more eaſily managed in the ſhafts: and he ſubſtituted wood too for iron in the chains, which worked at the end of the beam. His inventive genius diſplayed itſelf in various other uſeful contrivances.

Mr. Brindley's attention to this part of mechanics was ſoon called off to an object of the higheſt national importance; namely, the projecting and executing of Inland Navigations, from whence the greateſt advantages ariſe to trade and commerce. In this period of our great me-

chanic's life, we ſhall ſee the powers given him by the God of nature diſplayed in the production of events, which, in any age leſs pregnant with admirable works of ingenuity than the preſent, would have conſtituted a national æra. We ſhall ſee him triumphing over all ſuggeſtions of envy or prejudice, though aided by the weight of eſtabliſhed cuſtoms, and giving full ſcope to the operations of a ſtrong and comprehenſive mind, which was equal to the moſt arduous undertakings. This he did under the protection of a noble duke, who had the diſcernment to ſingle him out, and the ſteadineſs and generoſity to ſupport him againſt the opinions of thoſe who treated Mr. Brindley's plans as chimeras, and laughed at his patron as an idle projector.

His grace the duke of Bridgewater, as has been obſerved before, hath at Worſley, about ſeven miles from Mancheſter, a large eſtate that is rich in mines of coal, which hitherto had lain uſeleſs, becauſe the expence of land carriage was too great to find a market for conſumption. The duke, wiſhing to work theſe mines, perceived the neceſſity of a canal from Worſley to Mancheſter; upon which occaſion Mr. Brindley was conſulted. Having ſurveyed the ground, he declared the ſcheme to be practicable, and obtained an act for that purpoſe; the ſucceſs of which I have before deſcribed, being the firſt of the kind ever attempted in England. The principle laid down at the commencement of this buſineſs reflects much honour on the noble undertaker, as well as upon his engineer. It was reſolved, that the canal ſhould be perfect in its kind, and that, in order to preſerve the level of the water, it ſhould be free from the uſual obſtructions of locks. But in accompliſhing this end many difficulties were deemed inſurmountable. It was neceſſary that the canal ſhould be carried over rivers, and many large and deep valleys, where it was evident that ſuch ſtupendous mounds of earth muſt be raiſed, as could ſcarcely, it was thought, be completed by the labour of ages; and above all, it was not known from what ſource ſo large a ſupply of water could be drawn, even on this improved plan, as would be requiſite for the navigation. But Mr. Brindley,

ley, with a ſtrength of mind peculiar to himſelf, and being poſſeſſed of the confidence of his great patron, contrived ſuch admirable machines, and took ſuch methods to facilitate the progreſs of the work, that the world began to wonder how it could have been eſteemed ſo difficult.

When the canal was completed as far as Barton, where the Irwell is navigable for large veſſels, Mr. Brindley propoſed to carry it over that river by an aqueduct thirty-nine feet above the ſurface of the water in the river. This, however, being generally conſidered as a wild and extravagant project, he deſired, in order to juſtify his conduct towards his noble employer, that the opinion of another engineer might be taken; believing that he could eaſily convince an intelligent perſon of the practicability of his deſign. A gentleman of eminence was accordingly called in; who, being conducted to the place where it was intended that the aqueduct ſhould be made, ridiculed the attempt; and when the height and dimenſions were communicated to him, he exclaimed: "I have often heard of caſtles in the air, but never was before ſhewn "where any of them were to be erected." This unfavourable verdict did not deter the duke of Bridgewater from following the opinion of his own engineer. The aqueduct was immediately begun; and it was carried on with ſuch rapidity and ſucceſs as aſtoniſhed all thoſe who but a little before condemned it as a chimerical ſcheme. This work commenced in September 1760, and the firſt boat ſailed over it on the 17th July 1761. The particulars of the completing and finiſhing this navigation to Runcom Gap into the Merſey I have before deſcribed.

The ſucceſs of the duke of Bridgewater's undertakings encouraged a number of gentlemen and manufacturers in Staffordſhire to revive the idea of a canal navigation through that country, and Mr. Brindley was engaged to ſurvey it from the Trent to the Merſey; and upon his reporting, that it was practicable to conſtruct a canal from one of thoſe rivers to the other, and thereby unite the ports of Liverpool and Hull,

in

in 1766 this canal was begun by him, called the Grand Trunk Navigation, and conducted with great ſpirit and ſucceſs as long as he lived, and was finiſhed by his brother-in-law Mr. Henſhall, who put the finiſhing hand to it in May 1777, to the general ſatisfaction of the proprietors, and joyfulneſs of the whole country. This canal is ninety-three miles in length, and, beſides a large number of bridges over it, has ſeventy-ſix locks, and five tunnels. The moſt remarkable of the tunnels is the ſubterraneous paſſage of Harecaſtle, which is two thouſand eight hundred and eighty yards in length, and more than ſeventy yards below the ſurface of the earth. The ſcheme of this inland navigation had employed the thoughts of the ingenious part of the kingdom for upwards of twenty years before, and ſurveys had been made; but Harecaſtle Hill, through which the tunnel is conſtructed, could neither be avoided nor overcome by any expedient the ableſt engineers could contrive or deviſe. It was Mr. Brindley alone who ſurmounted this, and ſuch other difficulties ariſing from the variety of meaſures, ſtrata, and quickſands, as no one but himſelf would have attempted to conquer.

Soon after the navigation from the Trent to the Merſey was undertaken, Mr. Brindley deſigned and executed a canal from the Grand Trunk at Haywood to the river Severn, near Bewdley, whereby the port of Briſtol was united to the ports of Liverpool and Hull. This canal is forty-ſix miles in length, and was completed in 1772. Mr. Brindley's next undertaking was the ſurvey and execution of a canal from Birmingham to unite with the Staffordſhire and Worceſterſhire canal, near Wolverhampton. This navigation was finiſhed in about three years, and is twenty-ſix miles in length. The canal from Droitwich to the river Severn, for the conveyance of ſalt and coals, was executed alſo by Mr. Brindley. He likewiſe planned the Coventry navigation, and it was a ſhort time under his direction. But a diſpute ariſing concerning the mode of execution, he reſigned his office, which it is imagined the proprietors of that undertaking have ſince had cauſe to lament. Some little time before his death Mr. Brindley began the

Oxfordſhire canal, which unites with the Coventry canal; and that, with the Grand Trunk, will form an inland navigation from Liverpool and Hull to London. Although they were ſoon deprived of their able engineer, the work was carried on with ſpirit, and finiſhed with ſucceſs.

The canal from Cheſterfield to the river Trent at Stockwith was the laſt public undertaking in which Mr. Brindley was engaged: he ſurveyed and planned the whole, and executed ſome miles of the navigation, which was ſucceſsfully finiſhed by Mr. Henſhall in 1777. There were few works of this nature projected in the kingdom, in which our engineer was not conſulted. He was employed in particular by the city of London, to ſurvey a courſe for a canal from Sunning, near Reading, in Berkſhire, to Monkey Iſland, near Richmond; but when application was made to parliament for leave to effect their deſign, the bill met with ſuch a violent oppoſition from the land-owners, that it was defeated. Thoſe fine gentlemen would not ſuffer their villas to be diſturbed by noiſy boatmen, or their extenſive lawns to be cut through for the accommodation of trade and commerce; though it was from trade and commerce that moſt of their fine villas and extenſive lawns had derived their origin.

Mr. Brindley had for ſome time the direction of the Calder navigation; but he declined a farther inſpection of it on account of a difference of opinion among the commiſſioners. In the year 1766 he laid out a canal from the river Calder, at Cooper's-bridge, to Huddersfield in Yorkſhire, which hath ſince been carried into execution. In 1768 he reviſed the plan for the inland navigation from Leeds to Liverpool. He was alſo appointed the engineer for conducting the work; but the multiplicity of his other engagements obliged him to decline this employment. In the ſame year he planned a canal from Stockton, by Darlington, to Winſton in the biſhoprick of Durham. Three plans of the like kind were formed by him in 1769; one from Leeds to Selby, another from the Briſtol channel, near Uphill in Somerſetſhire, to Glaſtonbury,

Glaſtonbury, Taunton, Wellington, Tiverton, and Exeter; and a third from Langport, in the county of Somerſet, by way of Ilminſter, Chard, and Axminſter, to the ſouth channel at Exmouth, in the county of Devon. In 1770 he ſurveyed the country for a canal from Andover, by the way of Stockbridge and Rumſey, to Redbridge near Southampton; and in 1771, from Saliſbury, by Fordingbridge and Ringwood, to Chriſtchurch. He performed alſo, in 1772, the ſurvey for a navigation propoſed to be carried from Preſton to Lancaſter; and from thence to Kendal, in Weſtmoreland. He ſurveyed likewiſe, and planned out, a canal to join that of the duke of Bridgewater's, at Runcom, from Liverpool. If this ſcheme had been executed, it was Mr. Brindley's intention to have conſtructed the work by an aqueduct over the river Merſey, at a place where the tide flows fourteen feet in height. He alſo ſurveyed the county of Cheſter, for a canal from the Grand Trunk to the city of Cheſter. The plan for joining the Forth and Clyde was reviſed by him; and he propoſed ſome conſiderable alterations, particularly with regard to the deepening the Clyde, which have been attended to by the managers. He was conſulted upon ſeveral improvements with reſpect to the draining of the low lands in different parts of Lincolnſhire, and the Iſle of Ely. A canal was alſo laid out by him for uniting that of Cheſterfield, by the way of Derby, with the Grand Trunk at Swarkſtone. To the corporation of Liverpool he gave a plan for cleanſing their docks of mud, which hath been carried into execution with the deſired effect; and he pointed out alſo the method, which has been attended with equal ſucceſs, of building walls againſt the ſea without mortar. The laſt of our great mechanic's ingenious and uncommon contrivances that we ſhall mention, is his improvement of the machine for drawing water out of mines by a loſing and a gaining bucket. This he afterwards employed to advantage in raiſing up coals from the mines.

When any extraordinary difficulty occurred to Mr. Brindley in the execution of his works, having little or no aſſiſtance from books, or the labours

labours of other men, his reſources lay within himſelf: in order therefore to be quiet and uninterrupted whilſt he was in ſearch of the neceſſary expedients, he generally retired to his bed; and he has been known to lie there one, two, or three days, till he had attained the object in view. He would then get up, and execute his deſign without any drawing or model. Indeed, it never was his cuſtom to make either, unleſs he was obliged to do it to ſatisfy his employers. His memory was ſo remarkable, that he has often declared, that he could remember and execute all the parts of the moſt complex machines, provided he had ſufficient time to ſettle in his mind the ſeveral departments, and their relations to each other. His method of calculating the powers of any machine invented by him was peculiar to himſelf. He worked the queſtion for ſome time in his head, and then put down the reſult in figures. After this, taking it up again in that ſtage, he worked it farther in his mind for a certain time, and ſet down the reſults as before. In the ſame way he ſtill proceeded, making uſe of figures only at ſtated periods of the queſtion; yet the ultimate reſult was generally true, though the road he travelled in ſearch of it was unknown to all but himſelf, and perhaps it would not have been in his power to have ſhewn it to another.

The attention which was paid by Mr. Brindley to objects of peculiar magnitude, did not permit him the common diverſions of life. He never ſeemed in his element, if he was not either planning or executing ſome great work, or converſing with his friends upon ſubjects of importance. He was once prevailed upon, when in London, to ſee a play, having never been at an entertainment of this kind before. It had a powerful effect upon him, and he complained for ſeveral days afterwards, that it had diſturbed his ideas, and rendered him unfit for buſineſs. He declared, therefore, that he would not go to ſee another play upon any account. It might, however, have contributed to the longer duration of Mr. Brindley's life, and conſequently to the farther benefit of the public, if he could occaſionally have relaxed the tone of

his mind. His not being able to do ſo might not ſolely ariſe from the vigour of his genius, always employed on great deſigns, but be, in part, the reſult of that total want of education, which, while it might add ſtrength to his powers in the particular way in which they were exerted, precluded him at the ſame time from thoſe agreeable reliefs that are adminiſtered by miſcellaneous reading, and a taſte in the polite and elegant arts. The only fault he was obſerved to fall into, was his ſuffering himſelf to be prevailed on to engage in more concerns than could be completely attended to by any ſingle man, how eminent ſoever might be his abilities and diligence. It is apprehended, that by this means Mr. Brindley ſhortened his days, and in a certain degree abridged his uſefulneſs. There is at leaſt the utmoſt reaſon to believe that his intenſe application in general to the important undertakings he had in hand, brought on a hectic fever, which continued upon him ſome years with little or no intermiſſion, and at length terminated his life. He died at Turnhurſt in Staffordſhire, on the 27th of September 1772, in the 56th year of his age, and was buried at New Chapel in the ſame county. The vaſt works Mr. Brindley was engaged in at the time of his death he left to be carried on and completed by his brother-in-law Mr. Henſhall, for whom he had a peculiar regard, and of whoſe integrity and abilities, in conducting theſe works, he had the higheſt opinion.

Thus was the world deprived, at a comparatively early period, of this great genius,

"Of mother wit, and wiſe without the ſchools,"

who very ſoon gave great indications of uncommon talents and extenſive views in the application of mechanical principles, and who, by a happy concurrence of circumſtances, the chief of which was the patronage of his grace the duke of Bridgewater, was favoured with an opportunity of unfolding and diſplaying his wonderful powers in the execution

execution of works new to this country, and ſuch as will extend his fame, and endear his memory to future times. The public could only recogniſe the merit of this extraordinary man in the ſtupendous undertakings which he carried to perfection, and exhibited to general view. But thoſe who had the advantage of converſing with him familiarly, and of knowing him well in his private character, reſpected him ſtill more for the uniform and unſhaken integrity of his conduct, for his ſteady attachment to the intereſt of the community, for the vaſt compaſs of his underſtanding, which ſeemed to have a natural affinity with all grand objects, and likewiſe for many noble and beneficent deſigns, conſtantly generating in his mind, and which the multiplicity of his engagements, and the ſhortneſs of his life, prevented him from bringing to maturity.

An anonymous friend (as he ſtyles himſelf) of Mr. Brindley ſays, "He was the greateſt enthuſiaſt in favour of artificial navigations that ever exiſted. Having ſpoken upon various circumſtances of rivers before a committee of the Houſe of Commons, in which he ſeemed to treat all ſorts of rivers with great contempt, a member aſked him, for what purpoſe he apprehended rivers were created? Mr. Brindley, conſidering with himſelf a moment before he gave an anſwer, replied at laſt, *To feed navigable canals.*

"Employment in ſo many conſiderable works had made him think there was nothing impoſſible to him. He had always a favourite ſcheme of joining the two iſlands by a floating road and canal from Port Patrick to Donaghadee, which he was confident he could execute in ſuch a manner as to withſtand the moſt violent attacks of the waves.

"He had been ſo lowly educated, that he had learned neither to read nor write, and afterwards went no farther than ſigning his name; yet he could caſt up pretty intricate accounts in his head without difficulty or error.

" The late king of France, upon hearing what he had performed, had an inclination to ſee him, and to have him view the canal of Languedoc; but he ſaid he would make no journeys to other countries, unleſs it were to be employed in ſurpaſſing what was already done in them.

" Clear as his head muſt have been, he had, in delivering his opinion, ſo unmeaning and poor a way of expreſſing himſelf, that he was taken by many for an idiot." So far this anonymous writer; which, if true, will contribute ſtill farther to diſplay Mr. Brindley's turn of mind: but one part of his information is erroneous; for Mr. Brindley could both read and write, although but poorly: and he was ſo far from looking like an idiot, that he had an animated and ſenſible countenance.

We cannot conclude the preſent article better than by tranſcribing from one of our firſt female poets ſome lines beautifully deſcriptive of the new objects, which are preſented in a rural landſcape by navigable canals.

' Here ſmooth canals acroſs th' extended plain
' Stretch their long arms, to join the diſtant main:
' The ſons of toil, with many a weary ſtroke,
' Scoop the hard boſom of the ſolid rock;
' Reſiſtleſs thro' the ſtiff oppoſing clay
' With ſteady patience work their gradual way;
' Compel the genius of th' unwilling flood
' Thro' the brown horrors of the aged wood:
' 'Croſs the lone waſte the ſilver urn they pour,
' And cheer the barren heath or ſullen moor.
' The traveller with pleaſing wonder ſees
' The white ſail gleaming thro' the duſky trees,
' And views the alter'd landſcape with ſurpriſe,
' And doubts the magic ſcenes which round him riſe:

' Now

'Now meeting ſtreams in artful mazes glide;
'While each unmingled pours a ſeparate tide;
'Now thro' the hidden veins of earth they flow,
'And viſit ſulphurous mines and caves below;
'The ductile ſtreams obey the guiding hand,
'And ſocial plenty circles round the land.'

I ſhall now add a ſhort account of the internal ſtructure and appearance of the duke's coal mine; which may ſerve for a deſcription of other mines, whether of coal, iron, or any other kind.

You enter with lighted candles the ſubterraneous paſſage in a boat made for bringing out the coals, forty-ſeven feet long, four feet and a half broad, including the gunnels, and two feet ſix inches deep. This boat, when loaded, carries about ſeven tons, or ſometimes eight. In this manner you proceed up the canal to the lake at the head of the mine, diſtant three quarters of a mile: the two folding doors at the mouth are immediately ſhut on your entrance to keep out too much air if the wind blows; and you then proceed by the light of your candles, which caſt a livid gloom, ſerving only to make darkneſs viſible.

But this diſmal gloom is rendered ſtill more awful by the ſolemn echo of this ſubterraneous lake, which returns various and diſcordant ſounds. At one moment you are ſtruck with the grating noiſe of engines, which, by a curious contrivance, let down the coals into the boats. At another, you hear the ſhock of an exploſion, occaſioned by blowing up the hard rock, which will not yield to any other force than that of gun-powder; immediately after perhaps your ears are ſaluted by the ſongs of merriment from either ſex, who thus beguile their labours in the mine.

When you have reached the head of the works, a new ſcene opens to your view. There you behold men and women, almoſt in their primitive ſtate of nature, toiling in different capacities, by the glimmering

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of a dim taper: ſome digging the jetty ore out the bowels of the earth; ſome again loading it into little waggons made for the purpoſe; others drawing the waggons to the boats.

To a ſuperficial obſerver ſuch ſcenes ſerve only to amuſe the eye by their novelty, but to a reflecting mind they afford ample matter of inſtruction. When we behold a part of our ſpecies deprived of ſun-ſhine, the common inheritance of mankind, and buried in a diſmal and confined cavern, in which they can ſcarcely ſtand upright, our feelings prompt us to commiſerate their condition: but when we obſerve the lively ray of cheerfulneſs break forth in this ſcene of darkneſs and diſtreſs; when we behold the glow of health in the midſt of damps and ſuffocation, we then ceaſe to pity them, and begin to examine ourſelves; we then diſcover that our enjoyments above ground ſerve only to multiply our wants; and we are convinced of the truth of that maxim, which aſſures us, that happineſs is every where, or no where.

NAVIGATION from LIVERPOOL to HULL.

WHILE the duke of Bridgewater's curious inland navigation was carrying on, there were ſeveral views and ſurveys taken, to diſcover if poſſible a route for an inland navigation from Liverpool to Hull. I cannot ſet this undertaking in a clearer point of view, than by extracts from the reſolutions paſſed at the ſeveral meetings held on the ſubject, and from the different acts of parliament obtained, as alſo from a celebrated performance in which inland navigation is judiciouſly treated of. I ſhall likewiſe add ſome remarks and obſervations of my own, made on the different ſpots, as I have been employed in ſome of theſe works, and have attended others from curioſity; for it is certain that there is a rational as well as ridiculous curioſity, and that this principle is either uſeful or injurious according to the diſpoſition of the perſon in whom it prevails. In weak minds, it is the ſource of levity, and its

concomitant

concomitant ill conſequences; but in noble and ſcientific minds it is the parent of induſtry, and the guide to every uſeful ſpecies of knowledge.

In beginning this ſubject it will be neceſſary to revert back as far as the year 1755, when the corporation of Liverpool, ever attentive to its trade and commerce, employed two gentlemen (Mr. Taylor of Mancheſter, and Mr. Eyes of Liverpool) to ſurvey the country, and take levels, &c. with a view to join the river Trent to the Weever or Merſey, and to open a communication between thoſe great ſea-ports, Liverpool and Hull; by which the traffic of the eaſt and weſt ſeas might be carried on by an inland navigation, not exceeding one hundred and fifty miles, which now makes a circuit of above eight hundred miles, and is expoſed to adverſe and ſtormy winds. This inland navigation, it was propoſed, ſhould paſs through Nottinghamſhire, Derbyſhire, Staffordſhire, and Cheſhire, and after an accurate ſurvey it was found to be practicable. This ſurvey was chiefly promoted by the late Mr. Hardman, an active and able friend to the commercial intereſts of this nation, and one of the repreſentatives of that borough.

The public is indebted to the earl Gower (now marquis of Stafford) and the late lord Anſon, for another ſurvey of the intended courſe of this canal, made by Mr. Brindley in 1758, and afterwards reviewed by Mr. Smeaton, F. R. S. and Mr. Brindley, jointly; and theſe ſurveyors concurred in opinion, that no tract of land in the kingdom was naturally better adapted for the purpoſe of an inland navigation, and that none ſtood in more need of it, or was ſo convenient for an union of the eaſt and weſt ſeas.

In the year 1760, a public meeting was adverti ſed and held at Sandon in Staffordſhire, at which lord Gower, lord Anſon, and a great number of the neighbouring gentlemen, land-owners and manufacturers, attended; but difficulties ariſing, farther ſurveys were

adviſed, and one thouſand pounds ſubſcribed for the extending of the ſurveys from tideway to tideway. Another meeting was held the ſame year, and Mr. Brindley and Mr. Smeaton attended with their ſurveys, according to their laſt orders. The reſult of this meeting I ſhall mention hereafter, and give the reaſons why the ſecond plan was approved and executed in preference to the firſt.

CHAP.

CHAP. VIII.

Particulars of Two Plans for a Communication by Canals between Liverpool, Briſtol, and Hull.—Courſe of the intended Canals to join the River Weaver in Cheſhire to the Trent in Staffordſhire.—Expence of cutting, and Length of theſe Canals.—Number of, and Expence of conſtructing, the Locks neceſſary to complete them.—Advantages of them to the Counties through which they would paſs, and to the Nation at large.

IN the year 1765 two plans were offered to the public, for a navigable cut or canal to form a communication between thoſe great ſea-ports Briſtol, Liverpool, and Hull, by a junction of the rivers Severn, Trent, and Weaver or Merſey; and as a great many gentlemen in the counties, through which theſe rivers paſs, were divided in their opinions, ſome giving the preference to one plan, and ſome to the other; and as both the plans would be of the utmoſt advantage and utility to the land-owners and manufacturers of the places through and near which the propoſed canals ſhould paſs; I will, with permiſſion, deſcribe both in as conciſe a manner as poſſible; and as one of them was approved, and is executed, the impartial will be enabled to judge for themſelves, which ſeemed calculated to be moſt beneficial to the country. And firſt, I ſhall deſcribe the plan and route of the canal, which was laid down by the author of the Advantages of Inland Navigation, and which is marked in the map with dotted lines. This writer was a gentleman of ſuch property and local knowledge of the counties, and the trade and manufactures carried on in them (himſelf living in the centre of them), that I am greatly ſurpriſed his plan was not approved,

excepting in two particulars, in which it is, I think, very objectionable. Theſe are, firſt, his not going into the Severn lower down nearer Bewdley, than where his intention was at Tern-bridge near Shrewſbury, to avoid the ſhallows which lie between Bewdley and Shrewſbury, and muſt greatly regard the navigation between thoſe two towns. The other is his not going into the river Merſey at Runcom Gap, or into the duke of Bridgewater's canal at Preſton Brook, which falls into the Merſey at Runcom Gap, rather than, as by his plan, into the river Weaver, at Winsford-bridge, on account of the number of locks from thence to the tideway to go to Liverpool. It is alſo to be obſerved, that if it had joined the duke of Bridgewater's canal at Preſton Brook, the goods and merchandiſe brought by the canal from Hull and Briſtol, by the Severn and Trent, might have been conveyed to Mancheſter, without going down thoſe locks, ſeventy-five feet into the river Weaver, and up as many more into the duke's canal: beſides going round a point of land, and being liable to the obſtructions of neap tides and adverſe winds, by which barges may be retarded ſeveral days, and which I will more particularly explain, after I have given the route of both canals. But before I proceed, it will be proper to obſerve, that the route of the canals in both plans is exactly alike from Shutborough in Staffordſhire, down the river Trent to Wilſden Ferry, in order to avoid the ſhallows between Burton and Wilſden, rather than fall into the Trent, at Burton, which would ſave a cut of fifteen miles. If the obſtacle occaſioned by the ſhallows was obſerved there, how it ſhould have eſcaped the notice of a perſon of ſuch diſcernment and penetration, as the gentleman who planned the firſt route, is to me inconceivable.

To begin then with the firſt plan for a communication between Briſtol and Hull. It was propoſed, that the ſaid canal ſhould paſs from or near a place called Tern-bridge, on the river Severn, in the county of Salop; and from thence a little higher up than the courſe of the river Wroxeter, croſs the Uppington road, by Wanford and Allſcot, and croſs the road leading on the right to Wellington; thence by

Crudgington (where the river Tern comes from Drayton); thence up by the Wildmoors, by or near Chetwin Park, on the ſide of Pilſon Hill; thence croſs the low grounds near Flaſhbrooke Hall, in the pariſh of Adbaſton, making its firſt entrance into Staffordſhire, at Whitley Ford, and proceeding thence by the river Whit, at Batchacre Grange, and by the ſide of the Hill Park, along Tunſtal Moor, into the valley below Offley Park mills, where the higheſt ſummit of land is; thence it was to croſs the brook that runs from Cockmere, in Eccleſhall pariſh; and proceed by Perſhall low grounds, Eccleſhall and Byanna, down the valley to Hilcot and Chebſey, to the river Sow, that comes from Standon, where, about a mile and a quarter above Bridgford, the propoſed navigation from Liverpool, by the river Weaver, was to unite with the Briſtol. It was then to proceed along the meadows on the right-hand ſide the river to Stafford; from thence down by the river Sow, acroſs the Penk, and by Baſwich to Haywood Park; from thence by the river Trent, croſſing the ſame near Wolſely-bridge; and thence behind Biſhton Houſe, over the river by Rudgeley, acroſs the brook by Lee Hall, Armitage, and Bromley, and acroſs the river at Whichnor; thence by Branſton and Seany Park, leaving the town of Burton on the right, by Monk's-bridge, acroſs the river Dove to Eggington, being its firſt entrance into Derbyſhire; and from thence by Willington and Twyford, on the right by Cliff Hill, Black Pool, and Weſton; thence into the river Trent, at Mr. Drake's warehouſe at Wilden, where the river Trent is navigable without any inconvenience from locks, though there are ſome few ſhallows by Newark, Nottingham, and Gainſborough, to the great ſea-port at Hull.

LIVERPOOL BRANCH to the BRISTOL BRANCH.

HAVING planned out the courſe of the canal from Briſtol to Hull, I have now only to deſcribe the courſe of the Liverpool navigation from the Merſey (I believe the river meant is the Weaver) to the place

where it unites with the Briſtol canal (which I before obſerved muſt be at Bridgford, near Stafford). The river Weaver falls into the Merſey at Frodſham, and is now by act of parliament made navigable by the means of locks as far as Northwich, and further up to Winsford, for the conveniency of conveying the produce of the ſalt-works to Liverpool. I would therefore propoſe, ſays my author, that a navigable canal ſhould be made from Winsford, on the river Weaver, by Weaver Bank, Minſhull, and Barton Croſs, near Nantwich; from thence along the valley to Wybunbury, Checkley, and Rynehill Hall (where it quits the county of Cheſter, and enters Staffordſhire); from thence through Madeley Park, being the higheſt ſummit of land (between which place and Whitmore the river Sow takes it riſe, and runs in a ſouth-eaſt courſe to Stafford); from thence near Whitmore, Stapleford-bridge, Standon, Walford, Millmeeſe, Coldmeeſe, Shallowford, and Bridgford, where it muſt unite with the Briſtol canal, and proceed to Wilden, and ſo, according to the route before deſcribed, to Hull.

As I ſpeak from the authority of ſurveys that have been taken, I make not the leaſt doubt but the above ſcheme is both practicable and very eaſy to be executed at no very large expence, conſidering the great national utility it will be of, even to every individual, whoſe ſtate of exiſtence is not of the dormouſe kind, and whoſe degree of capacity is only a ſmall matter removed from the idiot, and will ſuffer him to feed himſelf. I will, therefore, proceed to ſhew how the ſame may be executed, after what manner; and, in regard to the expence, will calculate and come to as near a certainty as the nature of theſe ſorts of undertakings will admit of.

I would firſt propoſe, ſays my author, that the land to be purchaſed ſhould be eighteen yards broad; that the canal ſhould be in breadth at the top of the water nine yards, and ſix at the bottom; and that there ſhould be two towing-paths, four yards and a half each, on the ſides of the canal; that the depth of the water ſhould be at leaſt five feet, on account

account of the different ſorts of boats that are likely to navigate it: but as there ought to be ſome reſtriction with reſpect to the make of the boats, I ſhould think they ought to be fifty feet long, eleven feet broad, and built much after the manner and form of thoſe made at Bridgenorth on the Severn; nor ought they to draw more than three feet and a half of water when loaded. This kind of boats would better ſuit the navigation, in regard to paſſing one another, and the preſervation of the banks, and may be ſo built as to carry thirty tons burthen, and may coſt about fifty pounds with a maſt, main-ſail, and towing-line, &c. There might be a covered place in the ſteerage for a man and a boy to lie in, as they frequently want ſuch convenience, eſpecially where the country through which they paſs is thinly inhabited; and alſo, when they have any valuable goods on board, as it would then be imprudent in them to lie on ſhore, leſt they ſhould be ſtolen. There might alſo be a forecaſtle, ſix or eight feet long, towards the ſtem. Theſe veſſels will carry goods from Briſtol to Liverpool or Hull, without the trouble and freſh expence of reſhipping; as thoſe boats now uſed by the duke of Bridgewater on his canals in Lancaſhire will not bear the navigating the tide's way beyond the Hempſtones, and on that account are both troubleſome and expenſive, being ſeventy feet long, and ſix feet broad, and liable to great and numberleſs inconveniences. They alſo require double the quantity of water and labour, in carrying the ſame quantity of goods through a lock, that the veſſels I have here propoſed do, excluſive of the expence, trouble, and inconveniency of reſhipping. The ſort of boats moſt convenient cannot be properly aſcertained till the canals are finiſhed, as perhaps boats otherwiſe conſtructed will appear to be equally uſeful with thoſe I have here deſcribed.

As this navigation muſt be open to all perſons, it will therefore be ſomewhat difficult to confine every one to have their boats built in ſuch a certain manner as to prevent their damaging, in their paſſage, any part of the banks of the canals, and to procure the obſervance

obſervance of all ſuch rules and orders as may be made for the good of the ſame; upon that account I have allowed as great a breadth for the top of the canals as poſſible, to obviate the above inconveniences which are avoided in private navigation, where all the veſſels that can be uſed upon it are the property of one perſon, and the whole, together with both men and boats, immediately under his directions.

The expence of theſe canals will come to about nine hundred pounds a mile, including the purchaſe of lands, erecting locks, building bridges, and making the proper paths on each ſide for towing the boats; and ſurely this is not to be conſidered as a large ſum, when it is well known that many turnpike roads in England have coſt a thouſand pounds a mile to repair them. Then let us imagine the vaſt difference there will be in the carriage of goods, &c. between one and the other. We will ſay for example, that on a mile of any ſuch turnpike roads one thouſand tons of goods may be carried in a year, and in all probability the paſſage of goods upon one mile of theſe canals may not be ſo little as one hundred thouſand tons: therefore, why can we think the expence great, according to this proportion of repairing turnpikes, when all goods may be conveyed from eaſt to weſt, much cheaper and ſafer than any other way by theſe navigable canals, and the price of carriage will always continue the ſame; whereas land carriage differs according to the badneſs of the roads, or the number of carriers, and is very often ſubject to great inconveniences, not to mention that all kinds of brittle goods are ſubject to be broke in pieces by loading and unloading into different waggons? It muſt therefore be allowed, that water carriage is undoubtedly preferable to land carriage, eſpecially on theſe canals where boats would meet with no difficulties, but always arrive at their ſtation by the appointed time.

The diſtances from place to place are as follow: From Tern-bridge, where the canal begins, oppoſite to Batchacre Grange, twenty miles nine perches; from thence to the higheſt point of land in the courſe of

of the canal, below Offley Park, four miles five perches; from thence to the junction of the river Sow, where the Liverpool canal joins, ſix miles; thence to Bridgford, one mile and a quarter; which makes thirty-one miles and a quarter, and one perch. To Stafford, three miles and three perches; from Stafford to or near Wolſeley-bridge, where the river Trent is croſſed by the canal, ſix miles and a quarter; from thence by Biſhton to Wilden Ferry, thirty-two miles; which makes forty-two miles. The diſtances on the Liverpool canal are as follow: From the meadow above Bridgford in Staffordſhire, where it joins the Briſtol canal to Madeley Park, being the higheſt ſummit of land in the courſe of the canal, near which place the canal runs both ways, north-weſt and ſouth-eaſt, is ten miles two quarters; from thence to Barton Croſs, thirteen miles; from thence to Winsford-bridge in Cheſhire, nine miles, one quarter, and ſix perches; which makes thirty-two miles, three quarters, and ſix perches.

The fall weſtward, between Tern-bridge and the higheſt ſummit of land in the canal courſe, where the water runs both ways, eaſt and weſt, which is in the valley below Offley Park, is one hundred and thirty-ſix feet nine inches; from thence to Bridgford eaſtward, it is fifty-four feet eight inches; from Bridgford to Stafford Mill Pool, from thence to the croſſing the Trent, near Wolſeley-bridge, and from thence to Wilden Ferry, it is one hundred and ſixty feet. Between Bridgford, in the Liverpool canal, and the ſummit in Madeley Park, the fall is one hundred feet three inches; and from thence to the Weaver, which runs a north-weſt by weſt courſe to Winsford, it is two hundred eighty-four feet one inch.

It is not material here to enumerate at length the diſtances and falls of water: I ſhall paſs them over, and proceed to obſervations of more importance. The reader muſt here obſerve, that the high ſummit of land between Offley Park and Cockmere Brook, being a diſtance of a mile and half, is an elevation of twenty-five feet, into which I propoſe digging

digging and removing the earth eighteen yards wide, the breadth of the canal, towing-paths, and drains: which we reduce to a level that breadth, and a fall decreaſing each way for a mile and half. In the whole, there muſt be removed at a medium one hundred ninety-eight thouſand and fifteen cubic yards of earth, which, at three-pence per cubic yard, would coſt two thouſand four hundred and ſeventy-five pounds three ſhillings and eleven pence; which reduces the level, and makes the fall to Tern-bridge weſtward, one hundred and thirty-ſix feet nine inches; and to Bridgford eaſtward, fifty feet eight inches: by which means four locks at leaſt will be ſaved.

It muſt alſo be obſerved, that the high point of land at Madeley Park is likewiſe an elevation of twenty-five feet for a mile and a half, which I would alſo propoſe to remove for the length of a mile and a half, and eighteen yards in breadth, decreaſing alſo each way (as both of them are in light ground, this might be done with little labour); and to reduce the whole of this elevation as above, there muſt be removed, at a medium, one hundred and ninety-eight thouſand and fifteen cubic yards of earth, which, at three-pence per cubic yard, would coſt two thouſand four hundred and ſeventy-five pounds three ſhillings and eleven-pence, which will reduce the fall ſouth-eaſt to the junction of the canal above Bridgford, to one hundred feet three inches and a quarter; and from the ſaid point, north-weſt to Winsford-bridge, to two hundred eighty-four feet one inch, by which means four locks at leaſt will be ſaved.

As theſe diſtances and levels are taken by perſons who have been at a very great expence in aſcertaining them, they will no doubt be found very accurate; which is not the caſe with all ſurveys that are publiſhed, many of them being frequently erroneous. I ſhall now conſider in what manner it will be neceſſary to proceed in order to the obtaining an act of parliament for executing this great deſign.

The

The author next ſubjoins a copy of the propoſals for executing this great deſign.

Propoſals (to be printed in all the public papers) for meetings to be held at Briſtol, Liverpool, and Hull, and at all the intermediate towns, and to invite the maſters of the great furnaces and forges at Sambrook, Keinton, Tibberton, Upton-under-Haymon, Coalbrook Dale, Ketley, Horſey, Wytheyford, Moreton, Willey, Pitchford, Sutton, Longnor, and all the large various iron manufactories lying upon the intended navigation or Severn, to attend and concur with the land-owners in a petition to parliament. Then follows the form of the petition, and alſo a memorandum of the agreement or conſent of the land-owners, through whoſe lands the canal is to paſs, and the form of a ſubſcription paper for raiſing the ſum neceſſary for an application to parliament. He next gives the propoſals for raiſing the fund to defray the expences of making and finiſhing the ſaid canals, which will require the ſum of one hundred and ſixteen thouſand pounds; which ſum, it is intended, ſhall be divided into five hundred and eighty ſhares of two hundred pounds each; and that no perſon ſhall have above twenty ſhares; and that the money ſhall be advanced by each ſubſcriber in equal proportions, as the ſame ſhall from time to time be wanted; and bear lawful intereſt from the paying ſuch ſums till the navigation ſhall be completed; and from the time of the completion thereof, to receive the proportion of the profits ariſing thereby, according to their reſpective ſhares, which ſhall be made transferable by a form preſcribed in the act.

The following are the reſolutions agreed to:

"At a very numerous meeting of noblemen, gentlemen, land-owners, traders, and manufacturers, held at the ſign of the Star at Stafford, the 10th day of Auguſt 1766, it was unanimouſly agreed,

That application be made to parliament this ſeſſion, for an act to make a navigable canal from the river Severn at Tern-bridge in the county of Salop, and the river Trent at Wilden in the county of Derby; and alſo from the river Weaver at Winsford-bridge, in the county of Cheſter, to communicate with the above at Bridgford, on the river Sow, in the county of Stafford:

That it will be moſt convenient for the execution of this undertaking, if the making and completing the ſaid navigation, which has been eſtimated at one hundred and ſixteen thouſand pounds, were to be diſtributed into five hundred and eighty ſhares, and raiſed by ſubſcription; that no perſon ſhall have more than twenty ſhares; the money to be advanced by each ſubſcriber in equal proportions, as the ſame ſhall be wanted; and the ſhares made transferable by a form preſcribed in the act:

That a ſubſcription be immediately opened to raiſe a fund to ſupport the neceſſary expences of procuring the act; that the money thus ſubſcribed ſhall, after the obtaining of the act, be repaid to ſuch perſons as ſhall not be ſubſcribers, and allowed to ſuch as ſhall be ſubſcribers, in part of payment of their ſhares:

That a ſubſcription be alſo opened for the money which will be wanted for making and completing the ſaid navigation; that twenty days be allowed after this day to complete the ſaid ſubſcription; that the names of the ſubſcribers may be entered with of Briſtol, Glouceſter, Worceſter, Salop, Bewdley, Bridgnorth, Newport, Drayton, Eccleſhall, Stafford, Litchfield, Tamworth, Birmingham, Wolverhampton, Dudley, Rudgley, Burton, Walſal, Derby, Nottingham, Newark, Gainſborough, Hull, Nantwich, Northwich, Newcaſtle, Congleton, Frodſham, Cheſter, and Liverpool, where books will be open and kept to receive ſubſcriptions for that purpoſe; and an account is deſired to be tranſmitted from each gentleman at the end of twenty

days

days to of Stafford, (being about the centre) of the ſubſcriptions at each place; and if the ſubſcription ſhall not be then complete, to be left open until it is; the firſt ſubſcribers to have the benefit, if the ſums ſubſcribed ſhall exceed the ſum wanted; that ſubſcribers are to have votes, according to the number of ſhares, in the annual choice of a convenient number of directors to be limited in the act, who ſhall have the management and inſpection of the work; and that commiſſioners ſhall be named in the act, to determine all controverſies and diſputes that may ariſe: that proper proviſion ſhall be inſerted in the act, for making full ſatisfaction to the land-owners and their tenants, for all lands to be taken in for the uſe of ſuch navigation; and for all damages, both preſent and future, which they may ſuſtain thereby; and for giving all proper conveniences to ſuch land-owners, and their tenants; the ſame to be determined by commiſſioners or juries, where neceſſary, unleſs the parties agree otherwiſe: that it be propoſed, for the conſideration of parliament, that a proper toll be taken as tonnage, to be fixed by the act at about one ſhilling and ſix-pence per ton for each and every ten miles that each veſſel ſhall paſs upon the ſaid navigation; and alſo that the ſubſcribers may be paid five per cent. for their money in the reſpective ſums advanced, from the time of their paying in the ſame till the whole communication between the three ports ſhall be completed; and from that time they may receive their proportion of profits, according to their ſhares; and that the ſubſcribers be permitted to vote by proxy:

That no toll be taken for ſtone, gravel, or other materials for repairing the roads; nor for dung, ſoil, lime, or other manure uſed only for the improvement of land:

That theſe reſolutions be printed in moſt of the public papers for three weeks ſucceſſively.

The intereſt of the country and the public good are afterwards ſo

judiciouſly diſcuſſed in this excellent treatiſe, and the manner as well as matter of the natural produce and manufactures ſo particularly and minutely treated, that I ſhould leave this part lame and defective were I to omit the author's obſervations on this ſubject. Beſides, were I to deſcribe the produce and manufactures on the route of one canal, and neglect them in the other, it would be impoſſible for an impartial judgment to be formed; therefore, I think it moſt conducive to the intereſt and pleaſure of the reader to finiſh one account before I begin another: for this reaſon I ſhall reſume the ſubject in the author's own words, or I ſhould do injuſtice to all parties.

The author of the Advantages of Inland Navigation then goes on. " I have now gone through the forms and proceedings (except the levels and eſtimates, which will be given at the end of this treatiſe) neceſſary for obtaining an act of parliament, for the carrying into execution the foregoing plan of the navigation between the three great ports of Briſtol, Liverpool, and Hull. I ſhall now proceed to add ſome obſervations on the inland trade, and the increaſe of the export trade of this country.

" The vaſt importance that trade is of to this nation is too frequently and too ſtrongly inſtanced, even in the diſturbances of any manufacture whatever, which ſeldom fail to draw not only the attention of the people, but alſo the ſerious conſideration of the legiſlature, to interpoſe and alleviate their calamities and diſtreſſes. The late uneaſineſs of the weavers in London was a ſtriking inſtance that the leaſt indulgence to admit foreign goods into this kingdom (when our manufacturers in Spitalfields were able to furniſh as good, if not better); and preferring them to our own, was a clog upon our trade; and the diſtreſs of a few had like to have embarraſſed the reſt of the nation to find redreſs for their complaints. Nor can I get out of my head the preſent ſtop to all ſorts of trade (1766) in theſe parts, and the dreadful ſituation that thouſands of families are in from the refuſal the noble Americans have

have lately made of having any trade or communication with the mother ſtate, entirely occaſioned by an imprudent and ill-conſidered meaſure taken by the late adminiſtration, by advice of the financier Mr. G. G., in arbitrarily impoſing the ſtamp act upon the Americans; in the illegality of which both reaſon, argument, and humanity have refuſed to be parties concerned.

"I have ſaid, that to trade we owe our opulency, and for that convenience by far the greater number of this nation have fixed themſelves in towns, and have ſtripped the country of every laborious cottager (lately ſwarming with a cluſter of healthy children) by the landlords laying their farms into large takes: therefore, the greater numbers have got together, and trafficking with each other, it is natural even on that acconnt to have the greater regard to their proſperity; and as they ſubſiſt by trade alone, it is fitting the nation ſhould do all they can to protect, increaſe and encourage it; in ſhort, it is by trade alone we live, and by ſociety we are made happy, they being only brought about by an eaſy communication and connection one with another, throwing the whole nation as it were upon a kind of equality, giving to every man a liberty to improve. Among the ancients commerce did not appear unworthy the application of perſons of the firſt rank. Solomon, we are told, frequently joined his merchants' fleets with thoſe of the king of Tyre, for their voyage to Ophir; and by this means rendered himſelf, though in a little kingdom, the richeſt king of his time in the univerſe. How greatly did trade flouriſh under the Romans! what vaſt companies of merchants in the different cities are mentioned by our hiſtorians! and we always find, that thoſe nations that abounded moſt in ſhipping and navigation were the firſt leaders in trade, and ſpread themſelves in all the Levants ports and Egypt. The Greeks and Romans thus acquired their luſtre and power; and upon the ruins of them is our modern commerce founded, trading to the ſame places. It is morally impoſſible for men to flouriſh without the aſſiſtance of each other, as well as any eaſy communication from place to place. What makes the

Dutch

Dutch not only vie with all the world in trade, but really eclipſe them? What but their vaſt conveniences of inland navigation, by which the produce of all the internal parts of the provinces becomes an external commodity, and is carried to the furthermoſt parts of the globe, returning to the induſtrious labourer (who was the original proprietor of what would have been of no value at his own home) triplefold, and the returns made in things the moſt uſeful to his family. It was the eaſineſs and practicability of making canals that firſt led the Dutch to the deſire of trade and commerce, in which it muſt undoubtedly be allowed they exceed all other nations, and entirely owing to their inland navigable canals. The trade of Great Britain may claim ſome place under the ſhield of commerce; but it ſeems aſtoniſhing to a cool conſiderate mind, that Britons ſhould never heretofore have attempted inland navigations, nor endeavoured to effect an eaſy and mutual intercourſe through the whole iſland, and let each ſubject ſhare the gifts of nature in a more equal degree; by which means the exports would be doubly increaſed, and there would be a greater demand for the imports."—

"The advantages from theſe canals to this nation will be very great, as every perſon muſt allow that the ſtamina of our trade is the internal produce of the kingdom; and the nearer each manufacturer is to his market, the greater price his goods will take: for inſtance, if a perſon manufactures a piece of cloth (ſuch as is uſually ſent abroad for ſale to America, or elſewhere) in the county of Stafford, where he lives forty miles from the merchant's ſhip that is to carry it abroad, will he not be obliged to ſell it, upon the account of heavy charge of land carriage, for a much leſs price than if he could convey it at an eaſy rate to a ſeaport by means of this canal, and there ſell it at the ſame price that a factor would? Let us only conſider, that the factor buys up the goods or manufactures of perhaps fifty poor perſons, and conveys them to a merchant at a conſiderable large profit, which falls into the hands of the factor alone, and enriches only one; whereas, were each manufacturer to have a conveniency of conveying his own goods directly to the merchant,

merchant, all the profits monopolized by the factor would be divided equally among the fifty poor perſons, and enrich that number inſtead of one. The more hands any goods or merchandize go through the dearer they are to the conſumer; as every perſon, through whoſe ſhop they go, muſt have a profit: but in this caſe, the factor monopolizes the whole profits of fifty poor manufacturers.

" In caſe of invaſion or rebellion, by theſe canals our government would be able to tranſport their very heavieſt cannon to any part of the country in a very ſhort time; as alſo regiments, and their baggage, might be conveyed in a much ſafer way than by long tedious haraſſing marches through roads that are almoſt impaſſable, and oftentimes very far round to the point to which they want to come: beſides the ſaving in artillery horſes, and the expence of baggage waggons to the government, which uſually amounts to nearly as much as the pay of at leaſt one third part of the regiment for the time. Every perſon muſt remember the great difficulties encountered in conveying the cannon and other military ſtores, in the inconſiderate rebellion in 1745, even fourſcore miles from the metropolis, ſo exceſſively bad and deep then were the high-roads of theſe weſtern parts: and indeed, to ſpeak the truth, were the government to have occaſion now to convey the ſame military ſtores, there would be but little more expedition, unleſs they could be ſent by navigable canals.

" It has been a common objection againſt navigable canals in this kingdom, that numbers of people are ſupported by land carriage, and that navigable canals will be their ruin; and it has as often been ſaid, to remedy that inconvenience, that thoſe people may take to other trades, and turn either farmers or navigators, and, inſtead of driving a waggon, they may learn to ſteer and navigate a boat, which in time of war may turn out to the advantage of the navy, or merchants' ſervice (upon both which moſt of our learned authors agree that our ſafety depends): but I, more ſupple to the inclinations of my fellow countrymen, am unwilling

to unbend the crooked finger, or ſtraighten the almoſt diſtorted joint, inured to tally with the ſtroke of its accuſtomed trade, and at his old age deprive him of the art of his employment, and leave him in his ſecond childhood to begin the world again; and as the land carriage is chiefly carried on from trading towns and their neighbourhood, I muſt advance a very uncommon alterative, which would free the carrier from any fear of loſing his employment, or ſelling off his ſtock of horſes, viz. That no main trunk of a navigable canal ought reaſonably to be carried nearer than within four miles of any great trading or manufacturing town, conſidering the preſent ſtate and ſituation of affairs, and the propriety of blending the landed with the commercial intereſts; which diſtance from the canal is ſufficient to maintain the ſame number of carriers, and employ almoſt the ſame number of horſes as uſual, to convey the goods down to the canal, in order to go to the ſea-ports for exportation. When any perſon forms a project for the general advantage of the nation, he ſhould alſo conſider that of every individual, and be careful that one is not burthened in order to unburthen another. I therefore have made this uncommon propoſal, to favour the landed as well as the commercial intereſts; for I think it certain, conſidering both intereſts together, that it is not for the benefit of every individual in a trading city, to have the navigable canal come cloſe to their town, but that the ſame ſhould be at a proper diſtance, about four miles; ſo that each trade may ſtill have ſome employ, thoſe that carry the goods and merchandize, as well as thoſe who manufacture them. There is no doubt but the perſon who manufactures the goods might afford to export them to foreign markets much cheaper, by having the navigable canal come cloſe to him: but then we muſt conſider all parties when we talk of trade, and not let the carriers ſtarve while the traders and manufacturers ride in their coaches and ſix, exulting over their dejected and diſtreſſed brethren and fellow creatures. If a manufacturer can have a certain conveniency of ſending his goods by water carriage within four miles of his own home, ſurely that is ſufficient, and profit enough, conſiderring that other people muſt thrive as well as himſelf; and a proportion

of

of profit to each trade ſhould be the biaſſing and leading policy of this nation.

" It has been often objected, that an inland navigation deſtroys that noble breed of draught horſes, ſince there will be little or no occaſion for them; and upon that account that the farmers would not be able to ſell their oats: and it has as often been pleaded in excuſe, that the farmer might then turn his oat ground into wheat ground, and inſtead of ſo much land being employed to furniſh food for a thouſand horſes, the ſame land, when turned into tillage fit to ſow wheat upon, might produce ſufficient bread corn to feed two thouſand poor families. I have not leiſure here to diſcuſs each point ſo fully as I could wiſh, therefore, as I have before explained the commercial and landed intereſt in a medium way, I will reſt this debate upon the merits of the former clauſe.

" There certainly is nothing which requires the attention of the people of this nation more than the progreſs of huſbandry, and in attending to that we cannot have too great a regard to the intereſt of the farmer; and to eaſe him as much as we can in the burthens and hardſhips he undergoes, which are ſuch as even to reduce him to ſupport himſelf and family upon ſkimmed milk, whilſt he ſaves the cream for the reſt of his fellow creatures, and diſperſes it abroad in the nation to the nouriſhment of thouſands. What great advantages will he not receive from theſe canals by being able to ſell his corn, and carry it to any market at any time of the year; and as the plenty of corn in this kingdom, and the eaſy conveyance of it from one place to another is what will make a greater equality through the whole kingdom; and when it is cheap at home, he will be able to get a better price by conveying it to another market; and if it ſhould happen to be dear, any quantity might ſoon be brought from another country to ſupply their wants, by which means it would always keep at a medium price, the

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whole communication through, or in any place within twenty miles to the canal. It would then be an uncommon thing to hear of a riot on account of the dearneſs of corn. And I cannot help obſerving, that if corn and proviſions are cheap, the manufcturers might be able to work cheaper; and in ſo doing might always keep up a good export to foreign markets, in being able to underſell other nations, and at all times to have a market (on account of the merchandiſe being ſold cheaper) at foreign ports in preference to other nations.

" The exportation of corn encourages the growth of it, and is one main branch of the trade of this nation, and ought to be countenanced, I mean in a proper degree, and bear a proportion in the exports, according to the price or ſcarcity of it. Whilſt corn on an average is not more than five ſhillings and ſix-pence a buſhel let the exports be uninterrupted; but when it advances higher than ſix ſhillings, it is time then to ſtop it in a proportionate degree. I hope, when I ſay it is a branch of our trade, that the ſum of ſeven millions and a half of money, which, from the year 1746 to 1750 incluſive, was returned to this kingdom for five millions of quarters of grain exported (as appears from an account laid before the houſe of commons in 1751), will be a proof of its importance. Surely this well deſerves ſome attention as a main branch of our trade, and ſuch a one, that under the preſent happy government will alway increaſe inſtead of diminiſhing, as the baſis of that trade is the yearly product of our lands, and the materials all within ourſelves; and whilſt agriculture is daily improving, and the quantity of tilled land (from the incloſing of commons) is daily increaſing, this ſeems our natural trade, and all others appear as grafted here from a foreign ſoil, and ſometimes are too ſubject to canker at the root. How great will be the increaſe of the exportation of corn from theſe inland canals, when every farmer in the adjacent counties can almoſt, as it were, ſhip his corn from his own barn, and receive all the profits that the factor had uſed to have from the merchant himſelf! I will now

endeavour

endeavour to ſhew how much he will be a gainer by this convenience. Let us ſuppoſe, that a farmer in Staffordſhire (from whence immenſe quantities of corn are carried to Woor or Sandbach by land carriage, in order to go to Mancheſter for home conſumption, and to Liverpool for exportation) carries, for inſtance, one ton of corn, which he has agreed with his factor to deliver at Woor or Sandbach in Cheſhire: the charges of his team, and himſelf and man, going fourteen miles, will not be ſo little as twenty ſhillings, as he muſt be out two days, when he might ſend the ſame quantity of corn in a boat of his own at one ſhilling and ſix-pence a ton for each ten miles; ſo that it would not coſt him, charges included, more than five ſhillings: but if he ſhould pay freight, it might be about one ſhilling and ſix-pence for each ten miles, more than if he had a boat of his own. But I will go further, and ſay that he might deliver it at Liverpool himſelf at the ſame tonnage and freight, which would amount to a very trifling ſum more, at which place he would receive all the profits that the factor uſed to monopolize by ſuch conveyance. His horſes may be then employed in improving his land by carrying marle and manure to it; and he might incloſe and till more lands, which are now waſte grounds and commons. How greatly would agriculture be improved, and the increaſe and pruduce of our land fulfil the proverb of returning tenfold, and the ſhepherd made happy by the increaſe of his ſheep. I cannot omit mentioning, before I conclude the enumeration of theſe general advantages, that prodigious and immenſe convenience that the merchants at the three ports will receive from being able to ſend their merchandiſe by this canal from Briſtol to Hull; which is, in fact, joining the eaſt and weſt together. A merchant that trades from Briſtol to the north-eaſt parts of the globe, will ſend his goods by this canal to be ſhipped at Hull; and alſo a merchant at Hull trading to the ſouth-weſt parts of the globe, will ſend them by the ſame canal to be ſhipped at Briſtol; by which means they will both avoid that moſt tedious and hazardous voyage of two months round the land's end, and alſo the expence attending thoſe dangerous voyages, and find themſelves conſiderable gainers.

" I muſt here obſerve one very great and material advantage that inland navigation is of in keeping, through a whole country, an equimediate price of proviſions; for when any commodity is cheap at home, it may be carried to a more populous part to get a proper price for it; and when it is dear at home, it may be fetched from a cheaper market, and the poor will never be ſo liable to ſuffer by monopolize.

" The great advantage that this kingdom will derive from a leſs number of horſes being kept for draft is prodigious, as the ſame lands that kept twenty thouſand horſes, will now perhaps keep thirty thouſand fat oxen; by which means butcher's meat will be always cheap to the labouring poor, and the quantity of fat from ſo many beaſts will of courſe make candles cheap: and ſo many hides lower the price of leather, and if ſo, of ſhoes and all other things made of leather. Or the ſame quantity of land may then keep thirty thouſand cows, the milk of which will make both butter and cheeſe cheaper to the poor, as well as to the labouring manufacturer; all which articles are very conſiderable, and of material moment in the price of our manufactures, as they in a great meaſure work their trade to riſe and fall in price, according to the cheapneſs of their materials and the neceſſaries of life.

" Inland navigation will encourage old manufacturers to work with freſh vigour when they can obtain their materials cheap; and will give opportunity to ſet up new trades and manufactures, as the materials may be conveyed to any part of the country whatever.

" There are many large mines of valuable contents, that for want of carriage and conveyance are now uſeleſs; ſuch as ſtone, iron ore, marble, and quarries of various ſorts, that would then be opened and worked, and be productive perhaps of the greateſt advantages to the proprietor, as well as to the various parts of the kingdom, in which they might be purchaſed at an eaſy rate.

" The

" The coaſting trade ſeems to claim mention of the great advantages that will accrue to it by theſe navigable canals, as all or moſt of the goods that have uſually gone by land carriage from London to theſe countries, will now be ſent by ſhipping to the ports, and from thence be diſperſed far and wide by means of theſe navigable canals: for the more you open a channel, the more water is drawn from the head, and conſequently works its way farther on.

" They will certainly cauſe more ſhipping to be employed on the coaſts, and more ſailors to navigate them. I muſt here make one obſervation, that old men and worn-out ſailors may be employed on theſe navigable canals; and thoſe whoſe conſtitution will not ſuffer them to undergo the hardſhips and ſeverities of a ſea voyage, yet may do very well to navigate theſe veſſels on the canal: Every boy in each village through which the canals paſs will have a deſire to become a ſailor, and will be trained up in his early youth to hand a rope, and ſoon be fit to be of ſervice on board a ſhip; by which means theſe canals will become one of the moſt natural nurſeries for ſeamen for his majeſty's fleets, and the protection of this iſland; as alſo of ſhipwrights upon any emergency: both which are certainly great advantages to any ſtate.

" Theſe canals will be of great advantage to the landed eſtates, as more perſons will now come and ſettle themſelves on many commons adjacent to the navigation, for the benefit and conveniency of trade, and thereby improve and incloſe thoſe barren lands; and the preſent incloſed lands will reap great benefit, either by draining ſome that want it, or flooding others, which is reckoned a great improvement to meadow lands.

" I think the reſult of every plan and ſcheme for the public ſervice ſhould ultimately terminate in giving aſſiſtance to the diſtreſſes of the poor,

poor, and relieving their wants, by letting them have the neceſſaries of life at a cheap rate. This I term charity to our brother. This is the ſtamina of our trade, and a principal ſecurity for our preſent and future affluence.

" It is as impoſſible that the immenſe advantages that will accrue to this nation, in a variety of inſtances from inland navigation, ſhould be enumerated by one pen, as it is to number the ſands on the ſhore; I ſhall therefore proceed to point out ſome local advantages to the manufactures only, bordering on theſe canals.

" I will begin with the country about Tern-bridge, in the county of Salop, as the canal begins there at Severn. The amazing number of large iron works within four or five miles of that place, and all the way to Batchacre Grange, are aſtoniſhing. There are five large furnaces, viz. Coalbrook Dale, Madely Wood, Lightmore, Horſehay, and Ketley, which are computed to turn at leaſt eighty thouſand pounds a year each; and nine large forges, which may be computed to turn twelve thouſand pounds a year each per ann. viz. Keinton, Tiberton, Upton under Haghmon, Withiford, Moreton, Pitchford, Sutton, Longnor, and Sambrook. There are ſeveral other iron, coal, and lime works, and large manufactories in the neighbourhood of the rivers Tern and Severn, that will border or lie within four miles of this intended navigation. There are alſo on the Cheſhire ſide, lying on or near the river Sow, two more furnaces, viz. Madeley and Doddington, which may be computed as above; and four forges, viz. Lea, Winnington, Norton, and Warmingham, to be computed as above, beſides many other large iron and coal works, and other manufactories.

" As the great iron trade here carried on is but little known in other countries, I will proceed to ſhew what weight of carriage, and number of tons of materials uſed in that branch alone comes in and goes

goes out. As I collected my information from a master of one of the iron works, I hope it will appear that I have considerably under done it rather than over done it. I shall, therefore, next shew the number of tons coming in weekly and yearly, and going out.

Six furnaces, computed to turn yearly each - -	£. 80,000
Two ditto omitted.	
Twelve large iron forges, computed to turn yearly each -	12,000
Two ditto omitted.	
	£. 624,000

The weekly consumption of the six furnaces and twelve forges before-mentioned, is on a medium,

Tons of ore brought in, and pig iron - -	467
Ditto of iron manufactured going out weekly - -	252
Ditto of pit coal used weekly - - - -	237
Ditto of charcoal used weekly. - - - -	59

The above totals, multiplied by 52, make the yearly consumption as follows:

Tons yearly brought into the above furnaces and forges -	24,284
Ditto yearly going out manufactured - - -	13,104
Ditto yearly consumption of pit coals - - -	12,324
Ditto yearly consumption of charcoal - - -	3,068

N. B. There are many more iron works that lie within distance.

Total

	Tons.	
Total amount yearly of tons - -	52,780	
Reckoning on an average at 15s. per ton, the preſent price of land carriage coſts yearly - - - - - - - -		£. 39,585
Deduct for home carriage of pit coal for Salop furnaces - - -	9,360	7,020
	43,420	32,565

So that the ſum of 32,565 l. is the preſent price of land carriage yearly to theſe iron works alone; out of which we will allow 5s. per ton for land and water carriage at 1s. 6d. per ton for each ten miles on the canal, and the remaining 2s. per ton for land carriage, any where within ſix miles of the canal; ſo that it will ſtand at 10s. per ton, which amounts to 21,710 l. for the money ſaved yearly to theſe iron works alone by this canal, ſuppoſing the whole of the ſame conveyed upon it.

" We muſt obſerve, that the foregoing calculation is made within a circle of twenty miles. They frequently ſend iron to Burton by Iveſey Bank, which might be ſent by theſe canals; and alſo to Cheſter, and many other places at a very great diſtance. By lowering this heavy charge of carriage, the iron maſters will be able to afford to manufacture their iron much cheaper, and conſequently be able to under ſell any foreign markets, or any iron that ſhall be imported; and in a few years will prevent the uſe of it, by being able to ſell at a lower price than foreign can be ſold at. As long as iron takes a price it will always be imported, and whatever iron comes to a ſea port, whilſt your home-made iron is at a high price, will always work itſelf into the heart of the kingdom, let the paſſage or conveyance be as difficult as it will; but when once your materials come cheaper to you to manufacture

ture your iron with you, you will be able to ſell cheaper, and by that means only will prevent the importation of foreign iron.

" Cumberland ore alone is a very important article, which will entirely be conveyed along this canal from Frodſham in Cheſhire: a very ſmall furnace will uſe at leaſt one thouſand one hundred tons of it in a year, which comes now entirely by land carriage from Winsford-bridge, in the county of Cheſter, at ſix ſhillings per ton for a very ſmall diſtance, which may be conveyed by theſe canals to all or moſt of the furnaces and forges. If Liverpool and Hull ſhould ever have a ſeparate navigation, they will ſend foreign iron into thoſe countries, which theſe iron works, I now have been ſpeaking of, uſed to ſupply. I have therefore propoſed this plan for the junction of the three ports at the ſame time, otherwiſe the iron maſters about Severn in Shropſhire would have no opportunity of ſuch eaſy conveyance, and conſequently loſe the market, and muſt of neceſſity decreaſe their ſale, and greatly injure their works. I have dwelt thus long upon the iron trade, to ſhew that no branch of manufacture can reap more immediate benefit from the making of theſe canals for inland navigation, or more ſenſibly feel the want of them, when other parts of the kingdom have them.

" The next article of trade is the immenſe number of great coal works that lie bordering upon this canal in Shropſhire, Staffordſhire, and Cheſhire. I will firſt mention thoſe at Ketley in Shropſhire; from which many thouſand tons of coal are conveyed yearly to Shrewſbury by land carriage, which might be ſent by water. There are very great lime works nigh this canal, belonging to Brook Forreſter, Eſq. at Steeraway. The tons of lime got yearly may be about twenty thouſand, uſed for manure of land and for building. The yearly demand is very large; ten thouſand tons of which might be carried by water. About Newport, at Linſel, are very large coal and lime works, belonging to Earl Gower, and others, the produce of which is very great, being

computed yearly at thirty-five thouſand tons of coals, and thirty-five thouſand tons of lime; ten thouſand tons of each of which might be conveyed to all the north, eaſt, and weſt part of theſe countries, and might almoſt be delivered into the boats at the works, as a canal might very eaſily be made at the bottom of the hill by Cheſhul Grange, to unite with this canal a little below. The whole of the land to be cut through, being his Lordſhip's property, and if his Lordſhip did not chooſe to do it, the proprietors would gladly undertake it. The towns of Eccleſhall and Stafford, and the countries between, might be ſupplied at a cheap rate, and firing come more reaſonable to poor people. There are likewiſe ſeveral large coal works about Madeley Park, viz. Leyſit, Scotthay, and others, belonging to Sir Nigel Grieſly, Mr. Crew, Mr. Meynell, and Mr. Pool. There is alſo lime ſtone at Biſhops Offley, in the pariſh of Adbaſton, but which, for want of coals to burn it with, is made no uſe of. There are alſo other large coal works in Cheſhire, that go by various names, which ſupply the furnaces there, and alſo the town of Nantwich, Betley, and all the neighbourhood. Nantwich alone, in its preſent ſtate, may be computed to uſe twelve thouſand tons, and its neighbourhood to Winsford, about fifteen thouſand, which might be conveyed along this canal from Modeley pits in Staffordſhire; and inſtead of coſting ten ſhillings per ton land carriage, would coſt only one ſhilling and ſix-pence per ton, beſides freight, which may be reckoned at as much more; ſo that the price of the article of coals alone will be decreaſed to the labouring poor, and to the conſumer, ſeven ſhillings out of ten ſhillings, beſides that they would be enabled to fetch them at all ſeaſons of the year, let the roads be as bad as they might.

The next article that will prove the uſefulneſs of theſe canals is the lime, which is uſed for the manure of land, and is a moſt excellent and quick improvement. It has hitherto been uſed only where the carriage comes eaſy; it will therefore now become general, and many lands that have never yet been improved by it, will quickly aſſume another ap-

pearance, and demonſtrate in the moſt ſatisfactory manner the great utility of an inland navigation to any country.

" I cannot omit mentioning the great quantities of cheeſe that are yearly carried to Bridgenorth fair from moſt parts of Cheſhire and Staffordſhire: it is impoſſible to make an exact calculation, but ſuppoſe we may ſay a thouſand tons from theſe parts, which are now carried by farmers' waggons for twenty or thirty miles, being obliged to ſtay out with their team, at a great expence, three or four days, perhaps at little leſs than thirty ſhillings, with two tons of cheeſe only, which might be conveyed by this canal for twenty miles: freight and tonnage for ſix ſhillings only, and from Tern-bridge to Bridgenorth, for three ſhillings more; ſo that we ſee in this article alone there is one pound one ſhilling ſaved, beſides the work that the horſes may do whilſt at home four days. Surely, from this convenience the farmer can afford to part with his cheeſe much cheaper, and the poor may have proviſions at a more moderate price.

" The next manufacture that ſeems to claim our attention, with reſpect to diminiſhing the heavy burdens of land carriage, is the potteries of Burſlem and Newcaſtle, great quantities of the manufacture of which are ſent weekly from thence to Bridgenorth, through Eccleſhall and Newport. There are conſtantly two, and ſometimes three waggons which go every week to Bridgenorth, and uſually carry about eight tons of pot ware, to be conveyed to Briſtol by water; and their loading back uſually conſiſts of all ſorts of grocery, foreign iron, and white clay for Burſlem, to ſupply the inland towns of Newcaſtle, Stafford, Eccleſhall, Newport, and many others, and the countries between. Sometimes they bring Worceſterſhire hops and cyder from thence. The back carriage of the iron and clay being heavy goods may be computed at ten tons per week. But as there is a great traffic carried on in the cyder and hops alone by farmers' waggons, which are hired on purpoſe to fetch them, I will therefore compute that two thouſand tons of

hops and cyder come yearly into theſe countries, and far beyond them into Cheſhire; the whole of which might be conveyed by this canal, and thereby ſeven ſhillings per ton ſaved out of every ten ſhillings now paid for land carriage.

" Large quantities of pot ware from Burſlem are carried on horſes' backs in large crates to Bewdley and Bridgenorth, which might be entirely conveyed this way, and which may computed yearly at a hundred tons, at two ſhillings and ten-pence per ton, from Burſlem to Bewdley, whence they are ſent to Briſtol for exportation.

" I muſt not forget the number of pack horſes, about one hundred and fifty, that go weekly with woollen cloth, and various other kinds of merchandize, for exportation, from Mancheſter, through Stafford to Bewdley and Bridgenorth, computed yearly at three hundred and twelve tons of carriage, which might be conveyed above one half of the way by water, from Mancheſter to Northwich by land carriage, and from Northwich by water to Bewdley or Bridgenorth, which would be nearly one hundred miles by water; by which eaſy carriage the merchants at Briſtol would be able to export their merchandize much cheaper, and under ſell any other merchants at a foreign market: the manufacturer would alſo reap his ſhare of a profitable voyage, and by a quick return from the merchant would enliven his poor workmen, not only with prompt payment, but with future hopes of employment, by having his market as it were at hand.

" There is a great trade carried on at Shrewſbury in coarſe cloths and flannels, which come out of Wales, and ſupply a great part of Staffordſhire and Shropſhire bordering on the canal. Theſe might then be conveyed by this canal to Liverpool to be exported, and may be computed yearly at one thouſand tons, paſſing three ſcore miles on it.

" I cannot omit the great trade of ſalt that is carried on at North-

wich. The ſalt which can now only go to Liverpool by water, when this canal is made, may be conveyed at leaſt one half to Briſtol, and that made at Nantwich, which is now carried on horſeback, and ſerves three or four inland counties, and of which the quantity may be computed at four hundred tons, may then entirely be conveyed by water to theſe three or four inland counties, thirty miles upon an average.

The great trade that Cheſter now enjoys from Ireland in cloths and linen, and which occaſions ſo great a fair to be held there twice in a year, muſt, without doubt (whenever Cheſter ſhall have a canal to unite with this at or about Nantwich, which may eaſily be effected whenever the gentlemen of Cheſter ſhall think proper, at a very trifling expence), be conveyed from the fairs at Cheſter along this canal to Northwich, Nantwich, Eccleſhall, Stafford, Newport, Drayton, Salop, Bridgenorth, and various other towns, and the intermediate countries. The tons of cloth and linen only that are likely to be conveyed along this canal, may be computed at two thouſand yearly, forty miles upon an average, water carriage, on this canal.

The quantity of Cumberland red ore that is uſed at Doddington furnace in Cheſhire, is about eleven hundred tons yearly. It is brought from Frodſham, over Delamere Foreſt, in carts, at a very great expence. Could the great furnaces at Ketley in Shropſhire be ſupplied with this ore by water, the ſix furnaces there (which now buy Cumberland pig iron) would uſe twelve thouſand tons or upwards to ſerve the forges, and the ore would be brought along this canal ſixty miles at leaſt.

The great quantities of fine hard brick fit for floors, and blue tiles that are ſent for to Madeley Park from various parts of Staffordſhire and Shropſhire, and are conveyed at an immenſe expence by land carriage, may be computed at two hundred tons of bricks and tiles, that would be carried to all parts bordering on the canal. Let us ſup-

poſe

poſe a farmer goes ten miles for a load of tiles to Madeley, his waggon and two perſons with it muſt be out two days, which will coſt him more than twenty ſhillings. If he brings back a ton of tiles, as they ſeldom carry more on account of the badneſs of the roads to that place, he might convey the ſame for one ſhilling and ſix-pence tonnage (and one ſhilling and ſix-pence freight if he does not keep a boat of his own); ſo that he ſaves at leaſt fifteen ſhillings, allowing two ſhillings per ton for land carriage from the water ſide to his houſe. This ſaving is only in ten miles, and will be doubled if he lives at the diſtance of twenty miles; and as he will be able to carry more tons at a load, he will make a conſiderable ſaving from that circumſtance likewiſe, as a boat will bring thirty tons; ſo that in one day he may lay down bricks and tiles enough to build his houſe, and the next day may ſend his boat for a ſufficient quantity of lime and other materials, inſtead of lingering and dragging out a whole ſummer, and perhaps ſome part of the winter in bringing his materials by land carriage.

I cannot omit mentioning once more the vaſt quantities of corn, and all ſorts of grain from the counties of Stafford, Salop, and Cheſter, that will be ſent to all parts along this canal, to ſupply home as well as foreign markets; and from theſe three counties bordering on or within ſix miles of the canal (being great corn countries) we may at leaſt ſuppoſe fifteen thouſand tons will be carried yearly twenty miles upon this canal, which, reckoning one ſhilling and ſix-pence tonnage, and one ſhilling and ſix-pence for twenty miles on this navigation, will amount to a very large income.

We can, at preſent, ſcarcely imagine the quantities of different kinds of merchandiſe that will come upon this canal: it is morally impoſſible to ſtate them all. For as many different articles as are now made uſe of by man, ſo many different and various ſorts of merchandiſe will be carried along this canal.

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I will only mention one more conſiderable article, which will always be conveyed along this canal. I mean the timber for houſes, and alſo for ſhip-building, as within ſix miles of this canal, in Staffordſhire and Shropſhire, they may vie with all the reſt of the kingdom (taking the ſame compaſs) for the largeneſs of the oak trees fit for keels and building large ſhips. Theſe may be conveyed at leaſt ſixty miles upon this canal. We ſhould give ſome ſort of computation, what number of tons are now upon a medium yearly felled within ſix miles of each ſide of the canal, and in ſixy miles length-ways, which, if conveyed to Liverpool or Briſtol, may be ſuppoſed to paſs upon an average thirty miles upon this navigation (at a mean from the centre). We will ſuppoſe ten thouſand tons and upwards of houſe and ſhip timber, that will paſs thirty miles on this navigation, which, at one ſhilling and ſix-pence per ton, will amount to two thouſand two hundred and fifty three pounds: which will be an income that will accrue only between Briſtol and Liverpool, but would be much greater if carried down to Hull.

I muſt here obſerve, that all the trade, manufactures, and merchandiſe I have hitherto mentioned, are ſubſiſting between Liverpool and Briſtol only. I have not yet touched upon or taken notice of any trade from Stafford down by Burton to Wilden Ferry, which is about forty-three miles. It is a very great country for timber, but there is no very great or conſiderable manufacture any where within ſix miles of the canal, except I am to mention the large quantity of fine Staffordſhire ale that is brewed at Burton, and ſent to all parts, carrying on a large trade in that commodity alone. A great quantity of malt would no doubt be carried along this canal, thirty or forty miles perhaps from the inland parts; but I greatly fear that the farmers would be ſo fond of carrying their malt in their own boats to Burton, that being pleaſed with the produce of their lands being liquidated into that fine amber colour that always appears in Burton ale, they would be apt to ſtay and conſume the profits of the voyage in that bewitching liquor; ſo whether I can number it among the advantages to theſe countries, I cannot yet determine. However, the number of tons of malt that will be conveyed along the

the canal on this account, at leaſt twenty miles upon a mean, will turn out to increaſe the income of the canal. In caſe that Birmingham and Wolverhamton, Litchfield and Tamworth, ſhould ever have cuts made to communicate with this canal," (which ſince the publication of the pamphlet from which theſe extracts are made has been accompliſhed) " the chief of the tonnage upon this part would accrue from various manufactured goods which they ſend abroad to be ſhipped at Hull. Birmingham might have a canal made to go by Litchfield, and fall in with this at Kings Bromley Common, which would be about twenty-four miles. Wolverhampton might have a cut, either down by the Penk river, to fall in at the junction of the Penk and Sow, or by Hedgeford Pool, down that valley, to fall in by a forge about Rudgeley; but which of theſe two is moſt feaſible I cannot determine, the firſt being ſixteen miles, and the falls very great; the latter about eighteen miles, and the falls by the Penk much leſs. The trade and manufactures from theſe places might then be conveyed along this canal to Burton and Wilden, and thence along the river Trent to Hull; but as theſe manufactured goods are what are called light goods (in compariſon to pig iron and bars that are worked up in the furnaces and forges), and the quality much exceeding the quantity, I imagine they will not turn out ſo advantageous in the revenue from the tonnage as heavier commodities do, though they take the ſame quantity of water to go through the locks, and conſequently ought to pay in proportion equal to the diminiſhing the water in the locks, but that I am afraid will never be the caſe. As their goods are chiefly poliſhed and wrought iron, they may think that the damp that ariſes from freſh water may greatly injure the ſale of them by creating ruſt and ſoiling the poliſhed ſteel. Salt water has not that effect in ſo great a degree, though I believe they would ſooner prefer land carriage for ſuch goods, on this account, than water carriage. I cannot here number any part of this trade upon this canal, as it may perhaps never happen that they may have ſuch a cut as I before have mentioned; and when they have, the weight or income from tonnage will be but trifling, as they can go only about thirty miles upon it before they get into the Trent at Wilden,

Wilden, and they will ſend no other goods along it but what are for exportation, and, as I ſaid before, will turn out little to the income of the canal, being great in quality, but not in quantity; nor will it be a conſtant trade, only once or twice a year, when the merchant ſhips are ready for their voyage at Hull, as the manufactuerer will ſend the produce of a whole year's work at once; nay, perhaps in ſo little compaſs as a ſmall arms-cheſt, which may contain in nice poliſhed ware ſix or ſeven thouſand pounds worth, and perhaps would not pay to the tonnage of the canal above ſix ſhillings for the thirty miles upon it, as the goods at the utmoſt may not weigh above four tons.

" I muſt here take notice how eaſy the canal between Tern-bridge and Batchacre Grange to Bridgeford will be completed, as no country can be more properly adapted for a navigation, being ſo well ſupplied with water, and a little below Batchacre Grange there is eight miles, and only eleven feet fall; ſo that there will be eight miles without a lock. As I have mentioned ſome few words about the ſize of the boats neceſſary for this canal, I muſt give ſome deſcription of the ſize of the locks, the quantity of water they receive and diſcharge, and then ſhew the quantity of water in the reſervoirs, and where thoſe reſervoirs are to be made, and how many boats that quantity of water will ſuffer to go through each lock in a day. The canal is propoſed to be nine yards broad at the ſurface of the water, ſix yards broad at the bottom, and five feet deep in water: the ſides will be an angle of about forty-five degrees. The boats are to be fifty feet along, and twelve feet broad, and will carry thirty tons, and will draw three feet water loaded, with one maſt to lower down upon deck, a main-ſail, fore-ſail, and jib, and a ſpare ſquare-ſail to hoiſt up before the wind: decked from ſtem to ſtern, or as occaſion may require. One horſe will draw theſe veſſels at the rate of five or ſix miles an hour, and they will bear the tides way either to Briſtol, Liverpool, or Hull, which ſaves them the trouble of re-ſhipping.

" The locks are to be ten feet high, ſixty feet long, and thirteen feet broad : the ſurface of water running in each time the lock is opened, will be the height of the lock, which will be ten feet deep ; ſo that the waſte of water amounts at the locks to 288,8 cubic yards or 200 tons of water, the keel excepted.

" Now we are to ſee how many times that quantity is contained in the reſervoirs ; and the ſummit is the firſt place to be conſidered, which is in the valley below Offley Park. There is now a large reſervoir of water at Offley Park mills, which may be made twelve acres ſurface, and ten feet deep, which will contain 193580,6 cubic yards. There is alſo a large ſheet of water called Cockmere, thirty-five acres, which may be pounded up ten feet higher, and make a larger ſheet, both which would amply ſupply the weſt courſe, as at Batchacre Grange you have a reſervoir of eighty acres of water, which, at five feet deep, contains 645074 cubic yards ; on the ſides of which the intended canal is to go, which, without further ſupply, would be ſufficient for the locks as far as Severn, and ſuffer a veſſel to paſs through the locks fifty-ſix times each day. Numbers of brooks and rivers may be pounded up any where the whole way down to Tern-bridge on the Severn. There is no country ſo well ſupplied with water for frequent paſſage as this between Tern-bridge and Bridgeford. We will now ſhew how the eaſt courſe may be ſupplied, viz. from the ſummit below Offley Park to Bridgeford. Oppoſite almoſt to Offley Park is Cockmere, a large water of thirty-five acres, which is now higher than the ſummit of the canal, and may be pounded up to any height ; a yard or two without any damage, as the banks on each ſide are very high, and the valley above very quick in the deſcent and narrow ; ſo that the expence of having a ſurface of water of thirty-five acres, and ten feet deep, which would contain 564610,2 cubic yards of water, and fill the locks 1950 times, would be very ſmall. Many places all the way down to Bridgeford might be made for very large reſervoirs, which would ſupply the locks down by the Trent to Wilden Ferry, at no very great charge or trouble. We will

next conſider what quantity of water we ſhall have to ſupply the north-weſt courſe of the canal, between the ſummit at Madeley Park and Winsford-bridge; and therefore obſerve, that a large ſheet of water of forty acres, and five feet deep at a mean, which will contain 322537 ½ cubic yards of water, may be made above the ſummit in Madeley Park, at Madeley manor houſe, which will ſupply the north-weſt courſe, and ſuffer 1119 boats to paſs each forty days. As the current coming in, taking the ſummer through, will be able in that time to fill the ſame again, the head of this rivulet here would be ſufficient for ſuch ſupply at any time, and ſuffer about twenty-eight boats to paſs each day. The rivulet that riſes in the Can Bogs in Madeley Park, by making a dam at Charlton, would be eaſily made to ſupply the ſouth-eaſt courſe to Bridgeford.

" I muſt here obſerve, that the reſervoir at Madeley Park will be full as laviſh of its waters, and will be able to ſupply as quick a paſſage as that from Offley Park ſummit to Tern-bridge or Bridgeford.

" The great matter is to have water at the head or ſummit of your canal ſufficient for a quick paſſage: ſince if that is wanting your navigation will ſoon ſtop and become uſeleſs.

" Now I have made mention of the canal at Tern, I will make a few remarks upon the navigation of that part of the river Severn, from Tern-bridge down to Redſtone Ferry, which is about thirty-three miles; and as the difficulties of the ſhallows or fords attending that navigation are made a great deal worſe than they really are, by reports maliciouſly ſpread by evil minded perſons, it will therefore be neceſſary firſt to premiſe what they are in reality, and then to propoſe an eaſy method to obviate and remove ſuch difficulties, by deepening the ſhallow fords at a ſmall expence. There is no river that has ſuch a length of navigation (in England) as the Severn: you may navigate a veſſel of fifty tons, and not a lock the whole way, two hundred miles up to Welch Pool,

except in an exceſſive drought, which does not happen every year, and, when it does, never laſts at the longeſt above a month or two; but upon a ſmall quantity of rain falling will give water ſufficient. There are ſome few fords or ſhallows between Tern-bridge and Salop, but theſe may be very eaſily remedied. Between Tern-bridge and Bridgenorth, which is fourteen miles, there are in a very dry ſummer ſeveral ſhallows that go by various names; but at any of which a well conſtructed veſſel, carrying thirty tons, is ſeldom or never impeded, except at the three following, viz. the Lake, the Worps, and the Lydes. They lie all within the compaſs of a mile, and when the veſſels come there, they take out two tons or thereabouts to lighten them, and put them into ſmaller boats, and re-ſhip the ſame again in about a mile, without any additional expence to the perſon who ſends the goods. Theſe fords are partly oppoſite to Madeley wood: They are about half an hour unſhipping the goods, and about as much time in re-ſhipping. Between Bridgenorth and Bewdley are alſo fords or ſhallows; but they impede veſſels of that burden in a very trifling degree, except two ſhallows nigh to Bewdley. Below Bewdley to Redſtone Ferry are two more ſhallows, as bad as any of the above between Tern-bridge and Bridgenorth.

"The reader muſt be informed, that the loweſt water that ever happens in the drieſt ſummer is never leſs than eighteen inches, which is ſufficient to carry veſſels of ſixteen or ſeventeen tons burthen at any time.

"The river Severn is a free navigation, and no tonnage upon it, and the number of perſons navigating upon it live at various places, and are not connected in a body ſufficient to agree to remove theſe ſhallows, or to apply to parliament for an incorporation for ſuch a purpoſe; and as the old phraſe is, What is every body's buſineſs is no body's; therefore the reader muſt not be ſurpriſed why theſe ſhallows have not been remedied hitherto: nor let him be more aſtoniſhed, when he is informed that every and each of theſe ſhallows may be remedied and deepened,

deepened, ſo as to admit veſſels of fifty tons burthen, in the drieſt ſummers, for the trifling ſum of forty pounds each; but, as I ſaid before, what is every body's buſineſs is nobody's: ſo the thing has hitherto been neglected. I would therefore propoſe, that the proprietors of the Tern-bridge navigation here intended, ſhould have a power veſted in them to lay out any ſum not exceeding one thouſand pounds upon the river Severn, from Shrewſbury to Worceſter, in order to make the navigation of the Severn more commodious by deepening, ſcouring, and widening the ſaid the river or the banks thereof, or by any other method or contrivance, making and rendering the ſaid navigation more complete and perfect. As alſo a power ſhould be given by act of parliament for the towing, hauling, and drawing of veſſels and other boats, by horſes as well as men on both ſides of the river Severn. If the above requiſites ſhould ever be obtained, the Severn would then be called the moſt complete navigation in all the kingdom.

" Though in the former part of this treatiſe I have chalked out a method, whereby this intended ſcheme may be executed, and have propoſed the ſame to be done by a company of proprietors; yet I cannot help thinking, and ſtrongly recommending, that the government ſhould undertake a thing of ſuch immenſe and material conſequence to this nation, as the joining the three great ports of Briſtol, Liverpool, and Hull together by a navigable canal, as it ought to be executed in a noble manner, and not intruſted to the intereſted and narrow-minded notions of the upſtarts of every little trading town, whoſe ſole view will be their own good at the coſts of others. The deſign is great, and it were to be wiſhed the execution was ſo that ſuch a canal may be made of a ſize, width, and depth as will admit at all times ſuch veſſels as will bear the navigating through the tides way in the channel; and all things attending the execution of this deſign ſhould be of a piece one with another. It would be proper if the government were to ſtay the petitions of private people, and take a ſummer or more to conſider and find

find out which is the moſt proper part of the country to carry theſe communications through, not regarding in the leaſt any populous trading town; but they ſhould find out that courſe which would afford at the ſummits the moſt ample ſupply of water in a dry ſummer, as this is the chief article upon which the good or evil of ſuch navigation depends; for as there muſt naturally be a high ſummit of land between each junction, from whence the water runs both ways, which, unleſs there is an ample ſupply of water for the filling the two upper locks a number of times each day, in order to admit the paſſage of as many boats, it is in vain to propoſe the navigation that way; for every time a boat paſſes a ſummit lock, there will be required a ſupply of five hundred and ſeventy-ſix cubic yards of water: ſo, as many times each day as the current will be able to ſupply that demand, ſo many veſſels may have water to paſs. It ſhould, therefore, upon this account be wiſhed, that this material point may be well conſidered; for if the water in theſe main trunks ſhould fail, there is an end of the navigation. The proper courſe of ſuch ſupply ought firſt to be found out, not regarding, as I ſaid before, any particular populous town or manufacture whatſoever, as it would be the moſt proper for the trading and manufacturing places to have canals cut into the main trunk from each place or town. Many inconſiderate people will object and ſay, that it is of no uſe unleſs it comes by the trading towns. It ſhould readily be granted, that it would be convenient that the main trunks ſhould go by thoſe places, provided ſuch towns happened to be ſituated in a country that would afford the moſt ample ſupply of water; but for this ſmall trifling convenience to one town, ſurely the main communications between the three ports are not to be deſtroyed. Let all trading towns have canals cut into the main trunks: for if the main trunks want water the whole navigation is impeded. Some inconſiderate people may make uſe of an an argument, and aſk whether the Thames navigation coming cloſe to London does it any harm? They will be pleaſed to conſider, that London was ſituated for the conveniency of the navigation, and was built after it; and that there is a great difference between a town built upon a navigable

a navigable river, and a navigable river being brought to a town; the former having ſuited all their employments and trades accordingly at their firſt coming: when perhaps in the latter the whole face of the landed trade is to be changed, and the number of families that have hitherto ſupported themſelves by land carriage would be totally deprived of bread; and many other trades undergo an entire tranſmutation. One may therefore repeat the wiſh that the government would undertake the execution of the main trunks, and carry them through ſuch part of the country as will afford the moſt ample ſupply of water at the ſummits; and that the private canals from each trading town or place may be executed in the manner moſt intereſting and ſatisfactory to the inhabitants, at their own coſts and charges, and under their own directions.

" I have alſo, in the former part of this treatiſe (continues my author) deſcribed the canal as proper to be carried down to Wilden in Derbyſhire, yet upon mature conſideration, and having informed myſelf of many difficulties that may ariſe on account of the floods from the river Dove, which would greatly impede the execution of the navigation, by being obliged to raiſe a high bank along the meadows for almoſt three miles, with arches every hundred yards to ſuffer the floods from the river Dove to paſs through; I am, for theſe and many other reaſons, inclined to think that the canal ought to enter the Trent at Burton, as there is a navigation already made by authority of parliament, and which is reported to be no very bad one. It is granted to the Earl of Uxbridge, and is now enjoyed by his leſſees. The tonnage is very reaſonable, and large veſſels may navigate upon it. From Burton to Wilden is nearly ſixteen miles, and the water in the river Trent is deeper from Burton to Wilden, than it is below Wilden to Gainſborough, as there are more ſhallows in proportion below Wilden Ferry to Gainſborough than between Burton and Wilden (this I ſhall explain further on at a proper time). Between the latter, veſſels from thirty to forty tons may navigate, which are ſeldom or never impeded. From Burton to Gainſborough is about one hundred and ten miles, and boats are frequently

quently known to perform that voyage, and back to Burton in eight days. Tonnage upon the Burton navigation is very moderate; nor can it be conſidered in any ſhape as a monopoly, as the tonnage of that river from Burton to Wilden is no more than three-pence. From theſe, and ſeveral other arguments, I am induced to think that it would ſave a conſiderable ſum of money, by having the canal to enter at Burton, I dare ſay at leaſt ten thouſand pounds to the proprietors; but as I have chalked out the other, I muſt leave it to the conſideration of thoſe concerned. But in caſe the canal ſhould be made as far as Wilden, I think at leaſt that the proprietors who have been at the expence of the Burton navigation, ſhould have as many ſhares in it as their preſent debt amounts to, or in ſome meaſure that part of the tolls ariſing from the ſame length of the canal, as is oppoſite to their navigation, ſhould be appropriated for the payment of the principal or debt lodged upon the old navigation. I muſt however continue to think, that it would be no great detriment to the public were the canal to terminate at Burton: and for my own part would rather wiſh it, provided the ſame was to be put under the ſame directions, regulations, and orders, as by authority of act of parliament the preſent canal is intended to be; and that the preſent leſſees, when under ſuch reſtrictions, might be concerned as proprietors in the ſame.

" It is not requiſite to my preſent purpoſe, that I ſhould enter into the minutia of every article in the ſucceeding table; moſt of which have been before mentioned, either as produce, manufactures, or commerce. I ſhall now ſhew the groſs ſum the canal will produce, all expences paid.

" It will appear, when all circumſtances are duly conſidered, that the income of fifteen thouſand two hundred eighty-five pounds eighteen ſhillings, which is computed as accruing to the proprietors of the navigation, is, in fact, only a third of the real profits from the tonnage of goods; but as it ſerves the purpoſe of proving, that the income of this

canal

canal will pay the expence of making it in a few years after it is completed, and of ſhewing to the parliament, that the taking the ſame into conſideration is worthy the notice of the legiſlature to paſs an act for that purpoſe as a public good, and not only a local but a national benefit.

" I will now proceed to ſhew what ſum of money the proprietors will be enabled to borrow, paying five per cent. for the ſame from the time the ſums are wanted, for the execution of the deſign. The income (being only eſtimated as a third part of the really expected profits) amounts to the ſum of fifteen thouſand two hundred eighty-five pounds eighteen ſhillings, which will enable them to borrow the ſum of three hundred thouſand pounds, leaving the ſum of two hundred and eighty-five pounds eighteen ſhillings for repair of locks, and other accidents, and ſalaries to officers and ſervants; but if the income ſhould in a few years amount to forty-five thouſand eight hundred fifty-ſeven pounds fourteen ſhillings, it will enable them to borrow the ſum of nine hundred thouſand pounds, leaving the eight hundred fifty-ſeven pounds fourteen ſhillings for repairs of locks and ſalaries to officers and ſervants. We will now come to the eſtimate of the expence of making and completing the canal; and as I have before only reckoned the income as chiefly accruing between Briſtol and Liverpool, and very little on the part of the canal leading to Burton and Wilden Ferry, I will therefore firſt mention the ſum that will be required for making and completing the canal from Tern-bridge, on the Severn, by Batchacre Grange to Bridgeford in the county of Stafford, from thence by Madeley Park in the ſaid county, to Winsford-bridge in the county of Cheſter, to communicate from thence with the river Merſey by the river Wever.

" The ſum required will amount to ſixty-eight thouſand pounds, including all things during the execution of the work; the intereſt of

part of which muſt be paid out of the fund until profits accrue, which may happen in leſs than three years ſufficient to pay the whole intereſt, and replace the deduction out of the principal; and as the canal may be completed in four or five years between Briſtol and Liverpool, the principal in ſix years after might be paid off, and twenty-two thouſand pounds over the laſt year to pay off the intereſt of the ſum in hand, each year decreaſing gradually for ſix years, the account will ſtand thus:

"The certain income of the canal is fifteen thouſand two hundred eighty-five pounds eighteen ſhillings, which, at five per cent. enables them to borrow in the whole three hundred thouſand pounds.

"The expence of making the canal from Tern-bridge to Winsford-bridge, ſixty-eight thouſand pounds; ſo that if the proprietors only borrow ſixty-eight thouſand pounds, the intereſt required to pay for that ſum will be three thouſand four hundred pounds, there remain then eleven thouſand ſix hundred pounds to be divided among the proprietors yearly (over and above the five per cent.) as profits accruing from the canal, which, if the law would allow me to term it ſo, would be an income of upwards of twenty pounds per cent. to each proprietor, excluſive of the two hundred eighty-five pounds eighteen ſhillings, which is allowed for unforeſeen accidents, and yearly ſalaries to officers and ſervants. Surely all perſons will be induced, that have any ſenſe of their own welfare, to lodge their money in this fund, not only in order to lend their aſſiſtance to ſo public a good, but for the ſatisfaction of receiving twenty pounds yearly for each hundred pounds ſo lent, and the principal to be paid off in a few years, or at any time they chooſe it, and thereby ſecuring a certain annual large eſtate for themſelves, and their heirs and aſſigns for ever; and let each perſon conſider, that in ten or twelve years the income may amount to forty-five thouſand pounds per annum and upwards. How great and im-

menſe will be the profits accruing to the proprietors! They muſt be ſuch as to make every one repent that he had not the foreſight and prudence to lodge his whole fortune in ſo glorious an undertaking.

" I will now proceed to ſhew the expence of making and completing that part of the canal from Bridgeford, in the county of Stafford, by Stafford, Woleſly-bridge, and Biſhton, in the ſaid county; thence by Burton to Wilden Ferry, on the river Trent, in the county of Derby, being one fall from Bridgeford, ſouth-eaſtward to Wilden Ferry. The income of that part of the canal (which I muſt term the eaſtern branch) is not very conſiderable, but will chiefly ariſe from the carriage of corn and all ſorts of grain towards Wilden Ferry; and the carriage from Wilden back will be ſomewhat conſiderable in London goods brought to Hull by ſea, and thence along this cut to the inland towns eaſt of Stafford, being not many in number, as moſt of the country about Stafford will be ſupplied from Briſtol or Liverpool. The diſtance from Bridgeford to Wilden Ferry is forty-three miles; and the income to the proprietors may every year amount to the ſum of two thouſand ſix hundred and ſeventeen pounds ten ſhillings for tonnage of goods paſſing on the canal: the proprietors will therefore be enabled to borrow at five per cent. as before-mentioned, the ſum of fifty-two thouſand three hundred fifty pounds; and the eſtimate of the expence of making and completing the ſaid eaſtern branch will amount to the ſum of forty-eight thouſand pounds, including the things neceſſary. So that if the proprietors borrow the ſaid ſum of fifty-two thouſand three hundred and fifty pounds, the intereſt will amount at five per cent. to two thouſand four hundred pounds, and there will remain the ſum of two hundred ſeventeen pounds ten ſhillings to be divided among the proprietors as the profits of the canal; and if the law would allow me the appellation, would be more than an income of five per cent. per annum. I muſt alſo add, that this income will greatly and immenſely increaſe whenever Wolverhampton and Birmingham ſhall have cuts into it as before deſcribed (which is now completed).

" I have now ſhewn the profits ariſing and accruing on each part of this canal, and for the diſtinction of each part ſhould chooſe to divide them into three diſtricts, reckoning the junction of the river Sow, above Bridgeford, in the county of Stafford, as the centre where they all unite. The firſt diſtrict from the junction above Bridgeford, in the county of Stafford, to Tern-bridge, ſhould be termed the weſtern diſtrict, which is thirty miles and a quarter. From Bridgeford aforeſaid to Winsford-bridge, the ſecond diſtrict, which ſhould be termed the northern diſtrict, and is thirty-two miles three quarters. From above Bridgeford aforeſaid, by Burton to Wilden Ferry, being the third diſtrict, ſhould be termed the eaſtern diſtrict, which is forty-three miles; in all one hundred and ſix miles.

" The

"The Eſtimate of making the Canal from or near Tern-Bridge, on the River Severn, in the County of Salop, to the Junction at Bridgeford-Bridge, in the County of Stafford: The Diſtance being Thirty-one Miles and a Quarter. Riſe One Hundred Thirty-ſix Feet Nine Inches to the Summit. Fall to Bridgeford-Bridge Fifty-four Feet Eight Inches.

	£.	s.	d.
IN the intended courſe of this canal, between the upper end of Tunſtall Moors (in the valley below Offley Park), and its junction with a brook near to Cockmere: the diſtance being a mile and a half: the higheſt point of land being an elevation of twenty-five feet. To reduce this to a level eighteen yards in breadth (being the breadth of the canal, towing-path, and drains) muſt be removed at a mean 198015,84 cubic yards, which, at three-pence per yard, will amount to	2,475	3	11½
The canal is propoſed to be nine yards broad at the ſurface of the water, and ſix yards broad at the bottom. Theſe dimenſions, in thirty-one miles and a quarter, will produce 687637,5 cubic yards, to be removed, which, at three-pence per yard, will amount to —	8,595	9	4½
The canal, towing-paths, and drains, being eighteen yards in breadth, in thirty-one miles and a quarter (deducting one mile for waſte land), there will be one hundred and ninety-nine acres, one rood, and twenty perches: to purchaſe which, at 15l. per acre at a mean, will amount to — —	2,985	0	0
Twenty road bridges, at 80l. each, will be —	1,600	0	0
Fifteen water bridges, at 50l. each, will be —	750	0	0

Making

	£.	s.	d.
Making towing-paths, drains, gates, and fencing, at 10l. per mile, will amount to —— ——	312	10	0
From the higheſt point of land below Offley Park to the river Severn (the fall being one hundred thirty-ſix feet nine inches), ſuppoſing a lock neceſſary for every fall of ten feet, thirteen locks at leaſt will be required, which, at 450l. per lock, will amount to	5,850	0	0
From the ſaid higheſt point to Bridgeford-bridge (the falls being fifty-four feet eight inches), in the above-mentioned proportion, there muſt be at leaſt five locks, at 450l. each, will amount to —— ——	2,250	0	0
Two funnels between each lock, making thirty-four in number, at 10l. each. will amount to ——	340	0	0
Five per cent. upon the whole for unforeſeen accidents —— —— ——	1,414	3	0
£.	26,572	6	4

To make the three ſhallows between Tern-bridge and Redſtone Ferry, and the two below on the river Severn, to a proper depth of water fit to carry a veſſel of thirty tons, in the drieſt ſummers, at 40l. each, amounts to —— —— 200 0 0

N. B. Eighteen inches water is the loweſt ever known to be in the greateſt drought (which will always carry a veſſel of twelve or fourteen tons). This continues for three or four days, till rain comes; ſo that the alteration or deepening the fords as above will be neceſſary.

" The

" The Eſtimate of the Expence of making the Canal from the Junction above Bridgeford-Bridge, in the County of Stafford, to Winsford-Bridge, in the County of Cheſter. The Diſtance Thirty-two Miles and Three Quarters. Riſe to the Summit One Hundred Feet Three Inches and a Quarter. Reduced Fall to Winsford-Bridge, Two Hundred and Eighty-four Feet One Inch.

	£.	s.	d.
IN the intended courſe of this canal, between the lower end of Charlton Moſs, and about half a mile below Snape, the diſtance being one mile and half, the higheſt ſummit of land is an elevation of twenty-five feet. To reduce this to a level, eighteen yards in breadth, the breadth of the canal, towing-paths, and drains, muſt be removed at a mean 1980158,4 cubic yards, which, at three-pence per yard, amounts to	2,475	3	11½
The canal is propoſed to be nine yards broad at the ſurface of the water, and ſix at the bottom, and five feet deep. Theſe dimenſions, in thirty-two miles and three quarters, will produce 72011,8 cubic yards of earth to be removed, which, at three-pence per yard, will coſt —— ——	9,002	13	0
The canal, towing-paths, and drains, being eighteen yards, at thirty-two miles and three quarters, there will be to be purchaſed 214 acres, which, at twenty pounds an acre, will amount to —— ——	4,287	5	2½
Twenty-two road bridges, at eighty pounds each,	1,760	0	0
Three water bridges, at fifty pounds each, —	150	0	0

Making

	£.	s.	d.
Making towing-paths, back-drains, gates, and fencing, at ten pounds per mile —— ——	330	0	0
From the junction above Bridgeford, to the ſummit in Madeley Park, one hundred feet three inches and a quarter, ſuppoſing a lock at every ten feet neceſſary, it will require ten locks, at 450l. each, ——	4,500	0	0
From the above ſummit to Winsford-bridge, two hundred and eighty-four feet one inch fall; and ſuppoſing a lock neceſſary for every ten feet fall, it will require twenty-eight locks, at 450l. each, ——	12,600	0	0
Two funnels between each lock, will be ſeventy-ſix, at ten pounds each, —— ——	760	0	0
Five per cent. upon the whole for unforeſeen accidents —— ——	1,793	5	0
Total	£: 37,658	7	2

" The

The Eſtimate of making the Canal from the Junction of the River Sow, above Bridgeford to Burton, in the County of Stafford; and thence to Wilden Ferry, the Diſtance being Twenty-ſeven Miles to Burton, and Sixteen from thence to Wilden Ferry. Fall to Wilden Ferry Two Hundred and Nine Feet Four Inches.

	£.	s.	d.
THE canal is propoſed to be nine yards broad at the ſurface of the water, ſix yards at the bottom, and five feet deep: theſe dimenſions in forty-three miles will produce 945621,6 cubic yards to be removed, which, at three-pence per cubic yard, amounts to	11,820	5	4
The canal, towing-paths, and drains, being eighteen yards wide, and forty-three miles long, there will be two hundred and eighty-one acres and two roods, which, at thirty pounds per acre, amounts to	8,445	0	0
From the above junction to Wilden, is two hundred and nine feet four inches fall, which, at every ten feet fall, a lock being required, will be twenty-one locks, at 450l. each, and will amount to —	9,450	0	0
Two funnels between each lock are required, which makes fifty-two, at ten pounds each, and amounts to	520	0	0
Thirty-ſix road bridges, at eighty pounds each,	2,880	0	0
Seven water bridges, at fifty pounds each, —	350	0	0
Towing-paths, back drains, and fencing, at ten pounds per mile, forty-three miles, amounts to —	430	0	0
	£. 33,895	5	4

	£.	s.	d.
Brought over — — —	33,895	5	4
Five per cent. upon the whole for unforeſeen accidents — — —	1,677	5	0
£.	35,572	10	4

Additional charges in banking for three miles, and making arches againſt the floods in Dove meadows, not included, 3000l.

In caſe the canal ſhould be carried no further than Burton, and enter the river Trent there, would only coſt 23,801l. 4s. 1d.

By carrying the canal only to Burton, to enter the river Trent there, the money ſaved to the public would be 11,771l. 5s. 9d.

So far my author, whoſe plan was rejected. I ſhall now proceed to deſcribe the plan laid down by Mr. Brindley, which plan was approved and immediately carried into execution with the greateſt diſpatch and ſucceſs. This plan is traced in the map with dotted lines.

CHAP.

CHAP. IX.

Plan of the Canal propoſed by Mr. Brindley.—Advantages to be expected from it.—Manufactures, Commerce, and Produce of the interior Parts of the Country, through which it is to paſs.—Its Length, Breadth, and Depth.—Different Falls of the Two Canals.—Eſtimate of the Expence of completing it.—Comparative View of the Expence of Land Carriage and Carriage by Inland Navigation.—Comparative Statement of the Quantity of Land loſt by cutting the Canal, and that neceſſary to grow Horſe Corn only.—Facts and Reaſons proving Mr. Brindley's Plan to be preferable to that of which an Account is given in the preceding Chapter.—Objections made againſt it.

I SHALL now proceed to deſcribe the route of the other canal, from the river Merſey to the rivers Trent and Severn, planned and excuted by Mr. Brindley, engineer to the duke of Bridgewater, with its dimenſions, the expence of completing it, and the reaſons which induced the proprietors to prefer Mr. Brindley's plan to that of which I gave an account in the preceding chapter. I ſhall alſo briefly enumerate the advantages to be expected from it to the produce and manufactures of the ſeveral countries through which it paſſes.

At a very numerous meeting of land-owners, gentlemen, traders, and manufacturers, held at Wolſeley-bridge in Staffordſhire, on the 30th of December 1765, which meeting was attended by Earl Gower, lord lieutenant of the county of Stafford, and the members in parliament for that county, and thoſe for the city of Litchfield, and towns of

Newcaſtle-under-line and Clithero; as alſo by a great number of the principal gentlemen of that and the neighbouring counties, it was unanimouſly reſolved to apply to parliament for leave to bring in a bill for making a navigable canal from Wilden, in the county of Derby, through Staffordſhire to the river Merſey.

Lord Gower opened the meeting with a very ſenſible and elegant ſpeech; in which he expreſſed his ſatisfaction in ſeeing ſo many gentlemen met together upon ſo great a deſign. He declared, that he looked upon it as of the utmoſt conſequence to the manufacturers of that and the adjacent counties, and to the kingdom in general; that ever ſince he had heard of the ſcheme, it had been his determination to ſupport it with all his intereſt, both provincial and political; for he was ſatisfied, that the landed and trading intereſt were ſo far from being incompatible, that they were the mutual ſupport of each other; and therefore his lordſhip hoped that every gentleman preſent would concur with him in endeavouring to carry ſo noble and ſo uſeful a deſign into execution. Mr. Brindley, engineer to the duke of Bridgewater, was then called in, and examined, and the heads of the plan were alſo produced and agreed to with very little alteration, and the neceſſary ſteps taken for the intended application to parliament.

It was then reſolved, That it will be moſt convenient for the execution of this undertaking, if the expences of making and completing the navigation, which have been eſtimated at one hundred and one thouſand pounds, were to be diſtributed into five hundred and five ſhares, and raiſed by ſubſcription; and that no one perſon ſhould have more than twenty ſhares; and the money to be advanced by each ſubſcriber in equal proportions as the ſame ſhall be wanted; and the ſhares made transferable by a form to be preſcribed by the act.

That a ſubſcription be opened for a fund to defray the neceſſary expences in obtaining the act; and that the money there ſubſcribed,

ſhall, after paſſing the act, be repaid to ſuch as ſhall not be ſubſcribers, and allowed to ſuch as ſhall be ſubſcribers, in part of payment of their ſhares.

That a ſubſcription be opened for the money which ſhall be wanted for making and completing the ſaid navigation; and that fourteen days time be allowed after this day to complete the ſaid ſubſcription; and that ſubſcriptions may be entered with Meſſrs. , at Liverpool, Mancheſter, Congleton, Newcaſtle-under-line, Stratford, Litchfield, Birmingham, Tamworth, Wolverhampton, Walſal, Dudley, Burton, Derby, Nottingham, Newark, Gainſborough, and Hull, where books will be kept for that purpoſe; and an account is deſired to be tranſmitted from each gentleman of the ſubſcriptions at each place, at the end of fourteen days, to Mr. Sparrow, in Newcaſtle; and if the ſubſcription ſhall not then be complete, fourteen days more to be allowed.

That if the ſhares to be ſubſcribed after this day ſhall exceed the number which ſhall remain unſubſcribed this day, they ſhall be reduced in due proportion.

That it will be convenient in the execution of this undertaking, if the ſubſcribers were to have votes, according to their number of ſhares, in the annual choice of a convenient number of directors, to be limited in the act, who ſhall have the management and inſpection of the work, and to have commiſſioners named in the act to determine all controverſies and diſputes which may ariſe.

That proper proviſions ſhould be inſerted in the act, for making full ſatisfaction to the land-owners and their tenants for all the lands that ſhall be taken for the uſe of ſuch navigation, and for all damages, both preſent and future, which they may ſuſtain thereby, and for the giving all proper conveniences to ſuch land-owners, and their tenants: the

ſame to be determined by commiſſioners or juries, where neceſſary, in the uſual manner.

That it be propoſed for the conſideration of parliament, that a proper and reaſonable tonnage be fixed by the act, in proportion to the diſtance that each and every veſſel ſhall paſs upon the navigation; and alſo that the ſubſcribers may be paid five per cent. for the reſpective ſums advanced from the time of their paying in the ſame, till the whole communication ſhall be completed; and from that time, that they may receive their profits, according to their ſhares; and that the ſubſcribers be permitted to vote by proxy.

That no toll be taken for ſtone, gravel, or other materials, for repairing the roads: nor for dung, ſoil, or marle; nor more than half tolls for lime for the improvement of lands.

Before I proceed to the particular advantages to be expected from this canal, it may not be improper to ſtate the reaſons why a canal is to be preferred to a river navigation, which are many and important. The ſhortneſs of the voyage on the former, which is protracted on the latter by the winding courſe of the ſtream; the abſence of currents, which, in rivers, impede the upward navigation more than they aſſiſt the downward *, and hourly undermine and wear away the banks; the ſecurity from the miſchief and delay occaſioned by floods; the eaſier draught for the horſes, as the boats will in a canal move nearer the towing-path; and the advantage of chooſing high ground for the locks; while in the other caſe the ſituation of them muſt be regulated only by the accidental ſhallows of the rivers—are all circumſtances

* This advantage can hardly any where appear in a more full and ſtriking light, than at Barton-bridge, in Lancaſhire; where we may, at the ſame time, ſee ſeven or eight ſtout fellows labouring like ſlaves to drag a boat ſlowly up the river Irwell; and one horſe drawing two or three boats on the canal, which is carried over the river at this place like a magnificent Roman aqueduct.

greatly

greatly in favour of canals; and eſpecially the laſt: for as in river navigations the locks muſt frequently be erected on low lands, the neighbouring meadows are thereby often rendered damp and ſwampy; while in canal navigations this diſadvantage is not only avoided, but, as the canal, to purſue its moſt convenient courſe, muſt frequently wind along the edges of the riſing ground, numberleſs ſprings will be cut through, and the plain beneath rendered actually drier and more fertile. It is alſo another circumſtance not unworthy of notice in favour of canals, when compared with river navigations, that as the conveyance upon the former is more ſpeedy, and without interruptions or delays, to which the latter are very liable, opportunities of pilfering earthen wares, and other ſmall goods, and ſtealing and adulterating wine and ſpirituous liquors, are thereby in a great meaſure prevented. The loſſes, diſappointments, and diſcredit of the manufacturers, ariſing from this cauſe are ſo great, that they frequently chooſe to ſend their goods by land at three times the expence of water carriage, and ſometimes even refuſe to ſupply their orders at all, rather than run the riſk of forfeiting their credit, and ſubmitting to the deductions that are made on this account.

We may alſo add, with reſpect to the potteries in Staffordſhire, that this evil diſcourages merchants abroad from dealing in thoſe manufactures, and creates innumerable miſunderſtandings between them and the manufacturers.

This canal is deſigned to fall into the Trent at Wilden, rather than at Burton, to avoid the ſhallows which greatly interrupt the navigation on that river. At Harecaſtle, the higheſt part in the courſe of the canal, from whence the water falls north and ſouth, it will paſs above a mile under ground; by which means fewer locks will be neceſſary, and more water ſupplied from the coal-mines in that country; and the whole length of it, with the branches, will be upwards of an hundred miles.

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The canal, and veſſels to navigate thereon, are to be conſtructed on the plan found moſt eligible, from various experiments made on the duke of Bridgewater's navigation. From theſe experiments, his excellent engineer, Mr. Brindley, hath propoſed to complete this canal as far north as Harecaſtle, purchaſe the land, erect locks, make towing-paths, build bridges, and defray every expence, except that of obtaining the act of parliament, for ſeven hundred pounds a mile. To cut through Harecaſtle, it is ſuppoſed, will coſt ten thouſand pounds; and the remainder of the canal one thouſand pounds per mile. He propoſes to make the new canal twelve feet wide at the bottom, and three feet deep in general, but at the fords only thirty inches, and in common to ſupply it with a quantity of water juſt ſufficient for the navigation, and having no ſtream like thoſe in Holland.

The boats are to be ſeventy-feet long, ſix feet wide, to draw near thirty inches water when loaden, and to carry twenty tons burden. They are to be ſo conſtructed as to be able to ſail with either end foremoſt, by removing the rudder, and to coſt about thirty pounds each.

There is to be a man and a boy to each boat, which one horſe will draw with eaſe along the canal; but when neceſſary will be able to draw three of them.

It is propoſed to raiſe the money by ſubſcription in lots or ſhares of two hundred pounds each. No perſon to ſubſcribe more than twenty ſhares. The tonnage to be fixed by act of parliament, and veſted in the ſubſcribers as a ſecurity for their money. The company to be under the inſpection of commiſſioners, as in moſt other navigation acts. The ſhares to be made tranſferable in an eaſy manner, like government ſecurities. The navigation to be free and open to all perſons on paying the tonnage fixed by law; and land owners to have liberty to erect warehouſes and wharfs on the banks or ſides of the navigation.

It is alſo propoſed to repay the money for obtaining the act of parliament out of the capital ſtock, if the application to parliament be attended with ſucceſs.

PARTICULAR ADVANTAGES OF THE INTENDED CANAL.

The advantages ariſing from cheapneſs of carriage, and eaſy communication between the diſtant parts of a country and the manufacturing towns and ſea-ports reciprocally, are ſo very extenſive and complicated, that it is impoſſible to reduce them to any very exact eſtimation. If we would attempt to eſtimate them at all, it will be neceſſary to diſcover, as near as we can, how much the price of carriage is likely to be diminiſhed, and what quantities or kinds of goods will probably be conveyed by this navigation.

The courſe of the canal is from the Merſey, at Runcorn Gap, into the duke of Bridgewater's canal, by Haulton; thence up to Preſton Brook, to near Northwich; and thence to Middlewich, Warmingham, Elton, Sandbach, Lawton in Cheſhire, Harecaſtle, Burſlem, Newcaſtle, Shelton, Stoke, Fenton, Trentham, Barleſton, Darleſton, Stone, Aſhton, Sandon, Shutborough, Haywood, Biſhton, Wolſely, Rudeſly, Wichnor, Drakelow, Burton, in the county of Stafford, Egginton, Weſton, Aſton; and thence into the Trent at Wilden in Derbyſhire.

The price of land carriage, in the neighbourhood of the canal, is upon an average about nine ſhillings per ton for ten miles. It is ſuppoſed that the tonnage upon the canal, for the ſame diſtance, will be about two ſhillings, and the freight not above ſix-pence more, making together two ſhillings and ſix-pence per ton; ſo that near three-fourths of the preſent carriage will be ſaved to the public. And the difference between land and water carriage in other places confirms the juſtneſs of this concluſion. Land carriage, for inſtance, between Mancheſter and

Liverpool, which are about thirty-eight miles diſtant from each other, coſts forty ſhillings per ton; water carriage by the duke of Bridgewater's canal only ſix ſhillings and eight-pence one way, and ten ſhillings the other: ſuppoſe nine ſhillings upon an average; and the ſaving by the navigation is about three-fourths of the expence of land carriage.

If we ſuppoſe the ſaving to be only ſix ſhillings in nine, which is a very moderate computation, this circumſtance alone will not only enable land-owners, manufacturers, and merchants to convey many articles to markets where they never could have borne the expence of land carriage; but will alſo bring into uſe many natural productions, ſuch as coals, ſtone of various kinds, timber, iron ore, alabaſter, &c. &c. which from their unfavourable ſituations never could have been employed.

To give ſome idea of theſe advantages, we muſt endeavour to enumerate the chief ſources of employment for the intended navigation; and theſe may be conſidered under the three following heads: 1ſt. Natural productions of the countries that lie near the canal. 2d. Cultivated commodities and manufactures. 3d. Imported raw materials and general commerce.

From Northwich to Lawton, there lies a vaſt bed of rock ſalt, about forty yards thick, which, beſides being purified and cryſtallized for home conſumption and exportation, as will be mentioned in its proper place, might be made great uſe of in agriculture, and probably in metallurgy, and ſeveral of the mechanic arts, if any method could be diſcovered of granting the liberty of uſing it with ſafety to the revenue.

There is a mountain called Molecop, near Lawton, that contains four different and uſeful kinds of ſtone. 1ſt. Mill-ſtones, of an excellent quality, which are now carried by land upwards of one hundred miles,

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and to all parts of the intended navigation. 2d. A good lime-ſtone. 3d. A fine free-ſtone. 4th. Grinding-ſtones of different ſorts.

Near Wolſeley-bridge, and alſo a mile below Burton, a free-ſtone is found on the banks of the river Trent, excellent for its firmneſs and colour: ſome parts of which ſeem not inferior to that of Portland or Rock Abbey.

A mile from Rudgely, a blazing kind of coal, called canel, and other coals are found, belonging to the earl of Uxbridge. The lower ſtratum of theſe mines is ſaid to be a very valuable one; and it is apprehended a navigable ſough might be carried from the new canal into the heart of them, in the manner of the duke of Bridgewater's colliery in Lancaſhire: and that this would lay them dry, the want of which is the preſent obſtacle to their being worked, and at the ſame time convey the coals into the new canal, to the great advantage of the noble proprietor, and the neighbouring country.

Near that part of the river Trent, where the canal is to terminate, ariſes a vaſt mountain of lime-ſtone; on which the village of Breden in Leiceſterſhire is ſituated. At Tickenhall in Derbyſhire, not far from the laſt-mentioned place, there are alſo quarries of lime-ſtones; and at Barrow in Leiceſterſhire they burn an excellent kind of lime for building, which is conveyed to places at a great diſtance by land, every way; and lime is much wanted through the whole courſe of the canal, both for the purpoſes of architecture and cultivation.

A few miles lower, at Clay Hill, a firm and elegant alabaſter is found, proper either for ſtucco or ſculpture.

Not many miles from the river Trent, near the river Soar, in Leiceſterſhire (which it is to be hoped the gentlemen in that neighbourhood, and the inhabitants of Leiceſter, will now be able to make navigable without oppoſition), are the noted quarries of Swithland ſlate, a beau-

tiful and durable covering for houſes, and prodigious rocks of that kind of grey porphyry which is brought from Scotland to pave the ſtreets of London and Weſtminſter.

A great quantity of marle will be thrown out in making of this canal; and may beſides, in many places, be found ſo near the banks as to be delivered from the ſpade into the boats, which will greatly contribute to the improvement of ſuch land as ſtands in need of this kind of manure. Other manures will alſo be procured from large towns on reaſonable terms for back carriage; and as it is intended to exempt manure from the charge of tonnage, theſe advantages, together with the lime mentioned before, will double the produce and value of many farms bordering upon the canal.

Several parts of the country, in the neighbourhood of the canal, yield great quantities of that ſort of iron-ore, commonly called iron-ſtone, proper for making cold ſhort iron; and which, when mixed with the red ore from Cumberland, makes the beſt kind of tough iron, commonly called merchant iron. The iron-ſtone of this country is likewiſe ſo neceſſary for working the ore in the north, that even the great expence of land carriage has not prevented large quantities of it from being conveyed that way by the river Weaver to be ſhipped for Cumberland; and the ore from the north has been brought into this country under the like inconveniences. It ſeems, therefore, highly probable that the intended canal will occaſion the ſending much greater quantities of iron-ſtone into the north, and the receiving more red mine back in return, and thereby greatly increaſe the intercourſe between theſe two parts of the kingdom, to their mutual advantage.

Not only theſe natural productions that are to be found on the banks of the intended canal, but many of thoſe from the moſt diſtant parts of the country it is to paſs through, will have their value and conſumption greatly increaſed by this eaſy and cheap conveyance. Of this number

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are lead, copper, calamine, marble, rotten ſtone, raddle, white clay, ochres, &c. and many other articles will probably become uſeful to ſociety, which at preſent lie unmoleſted in their native beds.

From natural productions we may proceed to the conſideration of thoſe that are cultivated and manufactured; and that which deſerves our firſt attention under this head is corn: but this ſubject has been already ſufficiently entered into in the preceding chapter. I ſhall here therefore only obſerve that, in times of plenty, the land-owners and farmers near the canal will receive great benefit from the exportation of their grain of all kinds. In times of ſcarcity, the whole country will be relieved by a ſeaſonable importation; and thus the bleſſings of Providence be more equally and uniformly diſtributed, and an artificial dearth rendered almoſt impoſſible. How ineffectual would be the attempt of the moſt powerful monopolizer in ſuch a country as China or Holland, where plenty can be thrown into any market from all parts by means of navigable canals!

Another cultivated article of great importance is that of timber of all kinds, and eſpecially oak, of which there are many large woods near the courſe of the intended canal, that for want of a proper conveyance to ſea-port towns, where timber is much wanted for ſhip-building, are ſold in the neighbourhood at a low price. Any method of conveying ſo bulky an article as this to the places of conſumption at an eaſy expence, will greatly encourage the growth of it, and help to repair that decreaſe of ſhip timber in this nation, which is a very alarming circumſtance to a people whoſe riches and power depend ſo much upon navigation.

Cord-wood to make charcoal for the iron works, oak-bark for tanners, and woad, madder, and other articles, which may become the object of cultivation, will be carried at a cheap rate upon the canal, to the mutual advantage of the proprietors and conſumers. Wool, hydes, tallow, and proviſions of various kinds, will become more beneficial to the owners,

owners, by the advantage of an eaſy conveyance to places where they may be conſumed or manufactured.

As this canal will go through the middle of Cheſhire, ſo famous for the great quantities of good cheeſe it produces, the advantage ariſing to it from the dairies will be very conſiderable, as many hundred tons of this article are annually carried by land above forty miles to Willington in Derbyſhire, to be ſhipped for London and other diſtant markets, which will for the future be ſent by water all the way to Hull and Liverpool, at a very moderate expence.

From the Wiches in Cheſhire manufactured ſalt is carried on horſe-back to almoſt all parts of Staffordſhire, Derbyſhire, Yorkſhire, Leiceſterſhire, Nottinghamſhire, and Lincolnſhire, to which places it will gain much cheaper acceſs by means of the intended navigation. And ſo great is the home conſumption of this article, that from the ſalt works of Northwich only a duty of ſixty-ſeven thouſand pounds has been paid yearly into the exchequer: at Northwich and Winsford are annually made about twenty-four thouſand tons.

The town of Burſlem, and villages of Stoke, Hanley Green, Lane-delf, and Lane-end, are employed in the manufacturing of various kinds of ſtone and earthen wares, which are carried at a great expence to all parts of the kingdom, and exported to America, and to the Weſt India iſlands, and to almoſt every part of Europe: but the ware which is ſent to Hull is now carried by land upwards of thirty miles to Willington; and that ſent to Liverpool, twenty miles to Winsford. The burthen of ſo expenſive a land carriage to Winsford and Willington, and the uncertainty of the navigation from thoſe places to Frodſham in Cheſhire, and to Wilden in Derbyſhire, occaſioned by the floods in winter, and the numerous ſhallows in ſummer, are more than theſe low prized manufactures can bear, and without ſome ſuch relief as this canal which is under conſideration, our principal potteries muſt come

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to ſpeedy decay and ruin, as we have great competitors, both in France and the new United States of America, where they are puſhing that buſineſs forward to great advantage.

All the branches of the metallic trades, which are almoſt innumerable, and carried to an aſtoniſhing extent at Birmingham, Walſal, Wolverhampton, Dudley, and other places in the neighbourhood of the intended navigation, muſt receive advantages from it that cannot at preſent be eſtimated or conceived.

We have already mentioned the important circumſtance of bringing ores out of the north to mix with thoſe in Staffordſhire, by which the iron of that country may be rendered better and cheaper; and to this we may add the great advantage of having charcoal, lime, and other fluxes brought to the furnaces at a ſmall expence; and likewiſe the great ſaving there may be in conveying this heavy article from the forge to the manufacturer by water. Theſe are circumſtances which muſt contribute to increaſe the conſumption of Engliſh iron, and enable the iron maſters in that neighbourhood to enter into a competition with foreigners, ſo far as to reduce the price of foreign iron, and upon the whole greatly to benefit both themſelves and the manufacturers; and certainly the firſt object in the encouragement of any manufactory is to furniſh it with its raw materials at the loweſt price, to which nothing in general contributes ſo much as inland navigation.

By the means of this canal the iron maſters will be enabled to ſerve the manufacturers better with their materials; and by the ſame means the manufacturers will be enabled to ſend their finiſhed goods away much cheaper, and to more markets, by which the conſumption and exportation of them cannot fail to be greatly increaſed.

The circumſtance of a water conveyance all the way from Birmingham to the ports of Hull and Liverpool, will be a very great reciprocal

advantage

advantage to all the three places. The reduction of the price of carriage, which will take place between Birmingham and the laſt-mentioned port, is ſo great a proportion of the value of guns, nails, and other heavy manufactures of iron, that the exportation of them from thence muſt be increaſed to a degree beyond eſtimation.

The fine ale made at Burton upon Trent, which is now exported to Germany, Denmark, Sweden, Ruſſia, and the Weſt Indies, may, by means of the intended canal, be exported from Liverpool as well as from Hull, to thoſe places where it has become a very conſiderable article of commerce.

The valuable manufactures of Nottingham, Leiceſter, and Derby, will find a cheap conveyance to Liverpool by this navigation; and the demand for them at that port will conſequently be increaſed.

In the neighbourhood of Burſlem, at the potteries, bricks and tiles are made of a blue colour, which are ſo far vitrified as to be harder and more durable than any kind of ſtone uſed in building; and theſe articles will find a demand through the whole courſe of the canal.

Having mentioned the principal natural productions, cultivated commodities and manufactures in the neighbourhood of the intended navigation, we come to the articles of importation and general commerce.

Great quantities of flint ſtones uſed at the potteries in Staffordſhire, are brought by ſea from the different parts of the coaſt to Liverpool and Hull; and the clay uſed in the white and coloured ware is brought from Devonſhire chiefly to Liverpool; and from thence ſent up the river Weaver to Winsford in Cheſhire. The flints from Hull are ſent up the river Trent to Willington in Derbyſhire, and from Winsford and Willington they are brought to the works at a very great expence by land carriage, the one being twenty, and the other not leſs that thirty-

eight miles diſtant from the potteries. And they are likewiſe ſubject to the ſame delays from floods and ſhallows as the manufactured goods mentioned before, to the very great diſadvantage of the manufacturers; inconveniences which nothing but a navigable canal can remedy.

The iron ore from Cumberland, as it will be a conſiderable article of importation, muſt be mentioned in this place, though in another point of view it has been noticed before.

Deals and fir timber for building, and mahogany for cabinet work, which are much wanted, and are now very dear in many parts of thoſe counties through which the canal is to paſs, owing to the heavy charge of land carriage upon ſuch bulky commodities, will be conveyed through the whole extent of this navigation at a moderate expence, and become very conſiderable articles of commerce.

The numerous manufacturers in Birmingham, and its neighbourhood, will in general receive their raw materials of all kinds much cheaper by this canal; ſuch as copper, calamine, lead, zinc, ivory, and many others.

The merchants of Liverpool and Hull will ſupply the towns and villages bordering on the canal, with rum, wine, tobacco, ſugar, and all kinds of groceries and dying ſtuffs, at lower prices than they have been uſed to receive thoſe commodities, and with much more ſafety, cheapneſs, and expedition. And as theſe articles are of general conſumption, the amount of them muſt be very conſiderable, and the benefit to the public proportionably great.

The ſalt trade will receive a very important advantage from the canal, when the navigation of the river Weaver may at any time be interrupted, as that article may occaſionally be forwarded to Liverpool by this conveyance, for the diſpatch of thoſe veſſels which would other-

wiſe be detained there at a great expence. And any injury the proprietors of the Weaver navigation have to apprehend from it, ſuppoſing the navigation ſhould not terminate in that river, muſt weigh light in the balance of public utility, as their freight chiefly depends upon ſalt and ſalt-rock from Winsford and Northwich, which at preſent amounts to about fifty thouſand tons annually, and will no doubt be ſtill increaſed. And none of this is likely to come upon the new canal, but when ſfoods or the repairing of the locks obſtruct the navigation on the river Weaver, becauſe the canal will be ſome miles diſtant from Winsford; and though it ſhould come near the works at Northwich, the diſadvantage of loading and unloading, as the canal veſſels cannot live in the tide-way, will prevent the ſalt from being ſent by them, except on ſuch occaſions as before-mentioned.

Having conſidered the principal advantages which the public may reaſonably expect from the execution of this deſign, we ought not to forget the pleaſures that may ariſe from it to individuals, eſpecially as taſte is ſo univerſally cultivated, that our farms are gradually improving into gardens. And here it muſt be allowed, that to have a lawn terminated by water, with objects paſſing and repaſſing upon it, is a finiſhing of all others the moſt deſirable. And if we add the amuſements of a pleaſure-boat that may enable us inceſſantly to change the proſpect, imagination can ſcarcely conceive the charming variety of ſuch a landſcape. Verdant lawns, waving fields of grain, pleaſant groves, ſequeſtered woods, winding ſtreams, regular canals to different towns, orchards whoſe trees are bending beneath their fruit, large towns and pleaſant villages, will all together preſent to the eye a grateful intermixture of objects, and feaſt the fancy with ideas equal to the moſt romantic illuſions. Not to mention the convenience of having a variety of fiſh brought alive to our doors in well-boats, and ſea and ſhell fiſh freſh and good for our tables; we ſhall have articles of luxury, which the inhabitants near this navigation never could have the pleaſure of taſting, and which they may wiſh for at preſent in vain. So many and ſo im-

portant are the advantages which will undoubtedly ariſe to the public from the intended canal, that we preſume an attentive conſideration of them muſt convince every one, that they infinitely outweigh any inconveniences which can be ſuppoſed to attend them. And it is to be hoped every friend to his country will be cautious of giving weight to trivial inconveniences, even if they ſhould occur, in oppoſition to a work of this immenſe importance, eſpecially at a time when our manufacturers are ſuffering for want of the uſual demands for their goods; and when ſeveral rival nations, eſpecially the new States of America, are exerting every nerve to avail themſelves of this opportunity to ſeduce our workmen in every branch of manufacture to leave this country, and contribute to the ſupport of thoſe alarming competitors.

Some of the few objections that may be urged againſt this navigation have already been refuted, and thoſe that remain do not ſeem to be well founded, or of much importance. It may be ſaid, that many eſtates will be divided by the canal: but as in ſeveral parts it will be carried through uncultivated commons, heaths, and waſte lands, that want draining (which this canal will effect), and others that are not worth tillage, and a full compenſation will be made for the ground that will be cut through; and as the farms will be again connected by bridges and fords at ſuitable diſtances; it is preſumed no inconveniences will ariſe from this circumſtance, but what will be amply counterbalanced by the many advantages that have been before pointed out, and muſt evidently accrue to every farm through which it paſſes.

How far all the before-mentioned advantageous circumſtances muſt contribute to enhance the value of our lands, to promote the wealth, ſtrength, and ſplendour of the nation, and to confirm and perpetuate the peculiar bleſſings and privileges of its inhabitants, is referred to the candid reflection of every intelligent reader. The proſpect is delightful; and no doubt many advantages to be expected from the canal now

under conſideration, which have eſcaped my notice, will occur to the reader who lives on the ſpot. Thoſe that are pointed out are, however, very numerous and extenſive.

Nor will we here omit the trite objection reſpecting the diſhoneſty of watermen, that they will pilfer fruit and poultry on their paſſage. Certainly this claſs of travellers may be ranked in point of honeſty with the common carriers; and as one man and a boy will be ſufficient to attend the conveyance of twenty tons of goods along the canal, which by land would require the attendance of ten perſons, the number of theſe pilfering people will be greatly diminſhed.

As I am deſirous to anticipate every poſſible objection, in order to refute it as far as my abilities enable me, the only remaining one that occurs to me (and which indeed I mentioned before with a promiſe to obviate it) is, that by the inland navigation the coaſting trade, that great nurſery of ſeamen, will be diminiſhed. To this it may be fairly anſwered, that as this inland navigation will give an opportunity for a more eaſy conveyance of the produce and manufactures of the interior parts of the country to the neighbouring ſea-ports, which may from thence be conveyed by ſea to the diſtant parts of the kingdom, as alſo exported abroad to foreign markets, whence in return other produce and commodities may be brought back, the coaſting trade muſt thereby be greatly promoted; and as this canal will contribute to increaſe the produce of our farms, it cannot but benefit our preſent manufacturers, and occaſion the eſtabliſhment of new ones: it muſt alſo of courſe enlarge our exports, and, inſtead of leſſening, have, in my opinion, a direct tendency to augment the quantity of our ſhipping, and the number conſequently of our ſeamen. But were it otherwiſe, are not the public advantages which muſt neceſſarily reſult from this ſcheme ſufficient to counterbalance the loſs of a few hands taken from the coaſting trade, even if ſuch a loſs could be proved? That, however, ſeems to me impoſſible; and ſhall the leſſening to the number of ſeventy or eighty,

or

or even a hundred ſeamen in the coaſting trade, fill us with ſuch terrors and apprehenſions as to cruſh a ſcheme that may preſerve thouſands from periſhing? Beſides, as one man and a boy at leaſt, and in moſt inſtances two men and a boy, and very often four or five men, will be employed in each barge, theſe will acquire ſome knowledge of the nautical profeſſion; and, having been initiated in the uſe of oars and ſails, will, if wanted for the ſervice of their country, ſoon make good ſeamen.

It muſt alſo be obſerved, that when the other parts of this great deſign are executed, and the principal ports and manufacturing towns of the kingdom come to have a reciprocal inland communication by water, though the coaſting trade may be diminiſhed, the export trade will not only be greatly enlarged, but the internal national commerce will be carried on with much more eaſe and diſpatch; leſs expoſed to expenſive and hazardous delays, and perfectly ſecure in time of war from the depredations of an enemy.

The other part of this grand deſign is to have a cut for a canal, of the ſame dimenſions as the former, from out of the grand trunk from the river Trent at Haywood, at the confluence of the river Sow with the Trent, and by Baſwick, Acton, Dunſton, Penkridge, Brewood, Penford, Tunſtall, Trettenhall, Wolverhampton, Treaſel, Womborn, Holbeach, Preſtwood, Stourton Caſtle near Stourbridge, Kinfare, Overly, Kidderminſter, and into the river Severn, a little below Bewdley. The produce and manufactures of this part being in all reſpects the ſame as in the account particularly given of the other part of the canal, from Liverpool into the river Trent, it will not be neceſſary to repeat them. I ſhall, therefore, only juſt obſerve what a great advantage it will be to the different manufacturers, not only bordering on the canal, but alſo within ſix or eight miles of it, to have a water conveyance from their own doors, as it were, to the three greateſt ſea-ports in the kingdom (London excepted), Briſtol, Liverpool, and Hull. Another branch has alſo

alſo been projected (and ſince completed, of which I ſhall give a diſtinct account hereafter), by which this moſt uſeful inland navigation is carried into the river Thames at Oxford, which will interſect the kingdom by canals into four almoſt equal parts; the advantages of which cannot be eſtimated. But I moſt heartily congratulate my countrymen on their ſpirit and perſeverance to overcome all difficulties for the public good, and the benefit of the nation.

How far theſe favourable circumſtances muſt contribute to enhance the value of our lands, and to promote the wealth and flouriſhing ſtate of this nation, is referred to the imagination of every intelligent reader. To have the means of conveyance ſo greatly facilitated, the price of carriage ſo much diminiſhed, old manufactures encouraged, and new ones eſtabliſhed, eſtates greatly improved, plenty widely diffuſed, and the country in general rendered ſtill more affluent, populous, and ſecure, are conſiderations of ſuch weight, as cannot fail to intereſt all benevolent and public-ſpirited perſons in the ſucceſs of this moſt important undertaking.

After giving, as I have done, the neceſſary detail of the particular advantages of this extenſive canal, by which a communication will be opened between thoſe capital ſea-ports Briſtol, Liverpool, and Hull, it may be thought, and abſolutely is neceſſary to give the different lengths, falls of water, and the number of acres of land loſt or deſtroyed for the uſe of the canal; and theſe I have given before relative to the former plan. I ſhall here, however, give them for both navigations, to ſave the trouble of a reference.

According

According to the firſt account, by the author of The Advantages of Inland Navigation, the quantity of land to be purchaſed is:

	Acres.
From Winsford-bridge in Cheſhire, to Bridgeford-bridge in Staffordſhire —— ——	214
From Bridgeford-bridge in Staffordſhire, to Wilden Ferry in Derbyſhire —— ——	81 ½
From the junction at Bridgeford to Tern-bridge, Shropſhire —— ——	199 ¼
Total number of acres	494 ¾

By Mr. Brindley's plan, which is executed, the number of acres is only 482. The route of the canal is from Preſton Brook in Cheſhire, to go into the duke of Bridgewater's, and to Runcorn, by Great Haywood, to very near Litchfield, and fall into the river Trent at Wilden Ferry. This canal comes through the great hill, called Harecaſtle, above a mile under ground; and from Great Haywood, by Wolverhampton, into the river Severn, a little below Bewdley; and, from Great Haywood, is called the Wolverhampton canal.

By the firſt plan the number of miles is 107; namely,

	Miles.
From Winsford-bridge, on the river Wever in Cheſhire, to Bridgeford-bridge, in the county of Stafford ——	32 ¾
From Bridgeford-bridge, in the county of Stafford, to Wilden Ferry, in the county of Derby, ——	43

From

	Miles.
From the junction at Bridgeford-bridge, as above, to near Tern-bridge, on the river Severn, in the county of Salop	31 ¼
Total number of miles	107

By Mr. Brindley's plan the length is 139 ½ miles and one furlong; namely,

From Preſton Brook, in the county of Cheſter, to Harecaſtle in Staffordſhire —— ——	30
From Harecaſtle in Staffordſhire, to Wilden Ferry, in the river Trent —— ——	63
From Great Haywood in Staffordſhire, to the junction of the Birmingham canal, in the ſame county ——	22 ½
From the junction of the Birmingham canal into the river Severn, near Bewdley —— ——	24
Total number of miles	139 ½

By the firſt plan the falls of water are 730 feet 5 inches.

By Mr. Brindley's plan the falls of water are 1068 feet.

The greateſt objection made by the land owners and farmers to inland navigation, is the loſs of land by digging a canal, ſo far as private property is affected: but for this full compenſation will be made, as has been mentioned before, the act of parliament, wherever a canal is made, providing for every thing of this nature. Let us only conſider what an immenſe quantity of horſe provender is conſumed for the ſupport of that

that land carriage which theſe canals are ſure to reduce; and what a number of acres of land will be brought into cultivation for wheat and barley, which is now waſted for horſes. It appears, that every horſe employed on the road is allowed three pecks of corn per day; and ſeven quarters of oats on an average is the produce of an acre of land; whence it follows, that the four hundred and eighty-two acres of land loſt by the canal on Mr. Brindley's plan would keep only ninety-ſix horſes a year, and conſequently all the horſes uſed in broad-wheel waggons, and in land carriage, on or in the environs of theſe canals, above ninety-ſix, are ſaved to the public; and the land neceſſary to provide them with provender may be employed to grow wheat for the poor for bread, or barley to make malt for beer; which will increaſe the revenue, and will keep at home vaſt ſums of money that have been ſent out of the kingdom for many years paſt, for the importation of oats from abroad.

It is on all hands allowed, that it is of the utmoſt advantage and benefit to the nation, as well as to the land-owners, farmers, and manufacturers, even to the loweſt and meaneſt labourer and mechanic, that theſe inland navigations ſhould be multiplied and carried to the utmoſt extent poſſible. That they have already ſucceeded beyond expectation is undoubted, and to this ſucceſs may be attributed all the cuts that have ſince been made to the different manufacturing towns, and even to villages; the number of which is by no means inconſiderable, as may be obſerved by conſulting the map annexed to this work, drawn and carefully traced by the author.

I ſhall now proceed, after giving the deſcription of the plans and routes of the two canals, as I firſt propoſed, to give the obſervations that have been made for and againſt the canal falling into the river Weaver at Winsford, rather than into the duke of Bridgewater's canal at Preſton Brook, and ſo proceeding to Runcorn; and falling at the other end into the river Trent at Wilden Ferry, rather than at Burton; and into

the river Severn at Bewdley, rather than at Tern-bridge, near Shrewſbury *.

Facts and Reaſons, tending to ſhew that the propoſed Canal from the Trent to the Merſey ought not to terminate at Northwich and Burton, and to prove that Plan hath been well digeſted, and hath not wanted public Notoriety.

That the good of a part muſt always give way to the good of the whole, when they happen to interfere, is one of the moſt eſſential principles of civil aſſociation; but it is at all times reaſonable, that the great intereſts of the community ſhould be purſued and ſupported with as little injury as poſſible to individuals.

In the courſe of human affairs, and during the gradual improvement in the arts of life, ſmall things are conſtantly yielding to greater, bad to good, and good to better, in proportion as human genius expands, and enriches the world with its diſcoveries: and it is the unavoidable effect of every new improvement, in ſciences or in arts, to diminiſh the value of leſs perfect ſyſtems, and works of inferior utility.

But it is a circumſtance which gives much pleaſure to the friends and promoters of the bill for a canal from the Trent to the Merſey, that very few individuals will ſuffer by the execution of this great deſign. And when a work of ſuch extenſive utility is under conſideration, it is certainly deſirable to have it executed in ſuch a manner as to render it as complete as the nature of the thing will admit.

* Thoſe who would wiſh to ſee all the obſervations and replies, remarks and counter-remarks, facts and reaſons, ſtate of facts and reaſons, caſes, objections, ſeaſonable conſiderations, and ſupplement to ſeaſonable conſiderations, letters, &c. &c. &c. on theſe canals, may conſult the ſecond part of the Hiſtory (as it is called) of Inland Navigation, printed by Mr. Lowndes, Fleet-ſtreet, 1769.

The

The object of this design is not local, it is not confined to a few towns or counties. A great and general diminution of the price of land carriage, between the inland counties and sea-ports, will contribute most effectually to increase the cultivation of our lands, to reduce the price of our manufactures, and to give us a superiority over our most formidable competitors at foreign markets.

And when the branches that are already intended, and others that may be useful and practicable, are joined to this canal, the trade of a considerable part of the kingdom will receive the advantage of this new conveyance. It is therefore to be wished, that the main trunk may be terminated so as to facilitate commerce in the best manner, and such as shall most easily admit of further extension. For these purposes, the undertakers of this intended navigation are desirous that it may be terminated in a free part of the river Trent at one end, and carried to a part of the river Mersey at the other, which is not liable to the interruption of neap tides. By which means a communication may also be opened with the great manufacturing town of Manchester, and its neighbourhood; from whence the canal may be extended over the river into Lancashire, to the general benefit of the interior parts of that county, as well as the port of Liverpool, and of all the towns and places through the whole extent of the navigation.

That it would be a very great limitation of its utility, and consequently a public injury, to mutilate this great canal, by terminating it at Burton and Northwich, we presume will appear to every impartial person from the following facts and considerations:

By means of the junction of the great trunk with the duke of Bridgewater's canal near Preston Brook, merchandise will be conveyed from that part of the navigation near Middlewich to Manchester, without the interruption of a single lock, or the expence, damage, or delays

occaſioned by tranſhipping, uniformly and certainly in twelve hours; and from that part of the canal oppoſite to Northwich in about ten hours. But if this canal ſhould terminate in the river Weaver at Northwich, there muſt be forty-nine feet of locking between Middlewich and that place; which, at ſeven feet to a lock, will require ſeven locks, and between Northwich and the river Merſey there muſt be five locks more; ſo that all the goods going this way to Mancheſter, and its neighbourhood, muſt be carried down a ſort of navigable ſteps ſeventy-five feet to deſcend into the Merſey; and then be mounted up another ſeries of ſteps ſeventy-nine feet high, to come into the duke of Bridgewater's canal.

It is alſo neceſſary to obſerve, that all the goods muſt be tranſhipped at Northwich, which generally occaſions conſiderable delays as well as damage, and that the veſſels muſt wait for a ſufficient tide to carry them into the river Merſey; and when they get thither, they muſt lie at anchor till another tide enables them to turn a point of land, and get up to Runcorn Gap. This will be the quickeſt paſſage they can make: but they may meet with contrary winds, or ſtormy weather, that may retard their paſſage many days.

It is alſo very material to obſerve the different lengths of theſe two roads from Northwich to Mancheſter. By the two rivers, and the duke's canal, the diſtance is forty-eight miles; by the canals, only thirty-two miles: the difference ſixteen miles.

Another very material circumſtance attending carriage is the price of it. As the time and riſk in going from Northwich to Runcorn, by the two rivers, will always be as much, and often more than in going to Liverpool, the price will at leaſt be equal. The comparative expence of carrying goods by the canal at Northwich, and ſending them down the river Weaver, into the river Merſey, and up the duke of Bridgewater's canal

to Manchester; and of conveying them from the same place upon a level through the two canals, to that great manufacturing town, will stand as follows:

	£.	s.	d.
Tonnage and freight from Northwich to Liverpool is 5s. 3d. per ton, and we will suppose the same to Runcorn — —	0	5	3
Wharfage, transhipping, &c. suppose only —	0	0	9
Freight and tonnage on the duke's canal to Manchester	0	4	0
Total	£. 0	10	0

By the other way it will stand thus:

	£.	s.	d.
From Northwich to the point of junction with the duke's canal at Preston Brook, being eight miles —	0	1	0
From thence to Manchester — —	0	2	6
Freight, thirty-two miles, there being no lock —	0	1	8
Total	£. 0	5	2

A difference, in favour of the article going to market, of four shillings and ten-pence in ten shillings; being very nearly half.

But suppose the expence upon this comparison should have turned out just the contrary, and the expence had been equal, certainly the risk

riſk and delay of the circuitous conveyance would prevent the Manchester goods from ever being ſent this way: and indeed, to all who know the circumſtances, the propoſal muſt appear too ridiculous to merit a ſerious confutation.

Another way has been propoſed to defeat the intended union with the duke of Bridgewater's canal. It has been ſaid, that the Mancheſter goods may be conveyed to and from the ſame points by the Cheſhire canals, without this union. The agents of the bill for the great canal have conſtantly avoided interfering in any thing relative to the Cheſhire canals. But ſince attempts are made to prevent the public from having a much better conveyance to Mancheſter, they are obliged to requeſt that the following particulars may be properly attended to:

By means of the junction, goods may be conveyed from near Northwich to Mancheſter, upon a level, as has been obſerved before, in about ten hours, and his grace's canal is actually making, and will ſoon be finiſhed. Whether the other canals will ever be made is uncertain, though they ſhould receive the ſanction of the legiſlature: as it is the opinion of able and experienced engineers, that they will not coſt leſs than the enormous ſum of ſeventy thouſand pounds; and it is alſo very doubtful, whether all the tonnage that can reaſonably be expected to come upon them will raiſe ſo much money as will be neceſſary to keep the numerous locks in repair; and if the ſubſcribers ſhould upon reflection think this may poſſibly be nearly the truth of the caſe, it is ſcarcely probable they will chooſe to riſk ſo hazardous an experiment.

But ſuppoſe theſe canals actually made, the lockage up from Northwich to Motham will be not leſs than two hundred and thirty-five feet, and down from Motham to the level of Mancheſter one hundred and thirty-eight feet, which, at ſeven feet to a lock, will require fifty locks:

and

and the delay which this circumſtance muſt occaſion, will unavoidably be ſo very conſiderable as to render the other way much more expeditious and beneficial to the public.

It is alſo worthy of obſervation, that if the canal ſhould terminate at Northwich, the communication between the interior parts of the kingdom and the port of Liverpool would not be near ſo complete as if it were to terminate at Runcorn, as the conveyance by this laſt place would at the ſame time be cheaper and more expeditious.

If goods are taken off the canal at Northwich to be ſent down the Weaver, they will be liable to be retarded in the firſt place at Pickering's locks, about four miles above Frodſham-bridge, where there is a ſhallow, by which veſſels are detained ſometimes five, ſix, or ſeven days for want of water. The ſpring tides flow only here about an hour and a half each tide; and it is only during that ſpace (except in land floods) that a boat can paſs this ſhallow. There is likewiſe above Frodſham-bridge a bar that runs acroſs the river, which, during low neap tides, is impaſſable for three or four days. There are likewiſe ſeveral other ſhallows in this river. Theſe delays and inconveniences render this navigation ineffectual for the conveyance of the produce, even of the county of Cheſter, as far the moſt conſiderable part of the cheeſe produced in that county is now carried by land parallel with the whole length of this *excellent* navigation (as it is called) to Frodſham-bridge and Bank Quay; from which place it is conveyed by flats to Liverpool, there to be reſhipped for London and other markets. Salt likewiſe, the other ſtaple article of this county, is ſent in great quantities all by land carriage from Northwich to Mancheſter, for the ſupply of that town, and a very extenſive and populous neighbourhood, notwithſtanding the preſent navigable communication between thoſe places. Theſe are facts that prove to a demonſtration how ineffectual the preſent navigations are for the commerce of the country they paſs through,

and

and how much the counties of Lancaſhire and Cheſhire in particular are intereſted in having a better conveyance. And by the immenſe quantities of earth brought down by the artificial river navigations (which are perpetually robbing the land-owners of conſiderable parts of their eſtates) the depth of water in the rivers is conſtantly diminiſhing; ſo that theſe interruptions will be continually growing worſe.

And this navigation will not only be more liable to delays, but alſo more expenſive, than by Runcorn; as will appear from the following compariſon:

	£.	s.	d.
The freight and tonnage of ſalt and other merchandiſe from Northwich to Liverpool, by the preſent navigation, amount to 5s. 3d. per ton — —			0 5 3
The freight and tonnage from Northwich to Runcorn Gap, by the intended canal, will amount to only per ton — —	0	2	0
And from thence to Liverpool —	0	1	6
	0	3	6
Saving per ton by the canal			£. 0 1 9

And why ſhould the merchandiſe upon this great canal be ſubject to go by a dear and bad way, when it may go as well by a cheaper and a better? This would be ſacrificing the public intereſt to a ſmall concern, by which no perſon can ſuffer, as the ſalt from Winsford and Northwich will continue to go down the river Weaver to avoid tranſhipping; as

as that article alone will pay the intereſt of the debt, and as a conſiderable part upon that navigation may be paid off, if the truſtees think proper, before the great trunk can be finiſhed.

Let it alſo be well obſerved, for it is a circumſtance of great importance, that the water at Runcorn is about five feet higher than at Pickering's lock; and that ſuch veſſels as will be uſed in this trade will not be liable to be interrupted there by neap tides.

Theſe are facts, which, independent of the great object of going by a canal all the way to Liverpool, are, we preſume, ſufficient to convince every impartial perſon, that it would be much againſt the public intereſt to terminate the canal at Northwich.

It is likewiſe preſumed, that the following important facts will alſo ſhew that the other end of it ought not to terminate at Burton.

The river Trent is navigable by nature from Gainſborough to Wilden; and by an act paſſed the 10th and 11th of William III. the Lord Paget and his heirs were impowered to make it navigable from Wilden to Burton; for which they were to receive a duty of threepence per ton on all the veſſels that ſhould navigate upon that part of the river.

In purſuance of this act, the river has not been pounded up one inch higher than it was before, and conſequently the navigation hath not been eſſentially improved. Paſſages have only been opened through two mill-weirs, by means of two locks, which have frequently been made uſe of, not to facilitate but to obſtruct the navigation; and by a clauſe in this act all perſons are reſtrained from building wharfs or warehouſes on the ſides of the river, without the conſent of the noble undertaker and the commiſſioners. This circumſtance, under the ma-

nagement of the leſſees, hath rendered the navigation a complete monopoly.

The diſtance from Burton to Wilden, by the river, is about twenty miles; and from Burton to Wilden, by the intended canal, only fifteen miles.

If the canal ſhould terminate at Burton, as the mills and forge below the town are in poſſeſſion of the preſent leſſees of that navigation, it would be in their power, by drawing off the water, to lay the boats aground between the warehouſes and the mills; and thereby to diſtreſs the veſſels, and to interrupt all the commerce that might depend upon that part of the river.

There are upwards of twenty ſhallows between Burton and Wilden, which are not navigable, except when there are freſhes in the river, but by means of fluſhes of water let off from the mills; and by withholding this water the leſſees may interrupt, and frequently have interrupted, the navigation below Burton lock; ſo that the navigation of this part of the Trent depends entirely upon their pleaſure.

In the weir at King's Mills there are a number of flood-gates; one of which is very large, and was made by a former leſſee on purpoſe to draw the water off ſuddenly; and by means of theſe flood-gates the water may alſo be withheld or let off by the occupier of thoſe mills, ſo as totally to interrupt the navigation.

In the year 1749, the leſſees took an opportunity, when all the boats belonging to a certain company, which they wanted to diſtreſs, were below this weir, to ſink a boat laden with ſtones in the lock; and this anſwered their purpoſe, though it was a great injury to the public; for all the goods that went down the navigation during the ſpace of eight

years

years and eight months, were, by the continuance of this obſtacle, under a neceſſity of being taken out of the boats above the lock, and were then carried, or rather rolled and tumbled, into the other veſſels below; by which means many goods received great injury: and much earthenware eſpecially was ſent to foreign markets broken and deſtroyed, under all the expences of whole and perfect merchandiſe.

If the canal terminates at Wilden, the manufactures, malt, and other produce of thoſe parts of Leiceſterſhire, Derbyſhire, and Nottinghamſhire, that lie near to the termination, may be conveyed by water from Wilden to the port of Liverpool, and ſeveral northern counties, and entirely eſcape the ſhallows and other inconveniences of the Burton navigation. But if the navigation were to terminate at Burton, all the goods going upwards from the above-mentioned diſtrict muſt either be liable to the inconveniences of that navigation, or ſubject to the expence of land carriage of ten or fifteen miles; which expence would convey them half way to Liverpool.

In anſwer to the objection, that there are ſeveral ſhallows in the Burton navigation, it has been replied, that there are ſeveral ſhallows below Wilden; by which reply it is inſinuated, that if we have twenty difficulties to overcome, and cannot obviate them all, there is no advantage in avoiding one half of them:—an inſinuation that might have ſome little weight, if boats could not frequently paſs over the ſhallows below Wilden, by means of the additional water and freſhes of the rivers Derwent and Soar, when the ſhallows above Wilden are impaſſable.

The low tonnage on the Burton navigation is alſo produced as an argument againſt extending the canal to Wilden; but although the leſſees are not impowered to take more than three-pence under the name of tonnage, yet they find means to take eight times that ſum on the goods carried by others, under the name of wharfage. And if it

ſhould likewiſe appear, beſides the expedition and uniform diſpatch of a canal navigation, that goods may be conveyed to Gainſborough, from that part of the canal oppoſite to Burton, much cheaper than they are now carried by the river, it may certainly be preſumed the advantage of extending the canal to Wilden will not admit of the leaſt heſitation; and ſurely this is a plan of too much national conſequence to be abridged, or injuriouſly limited, for the ſake of thoſe to whom the public are not ſo much indebted for their paſt ſervices, as to lie under an obligation to indulge them in their preſent generous attempts to prevent any one elſe from ſerving it better.

	£.	s.	d.
On the beſt authority it is aſſerted, that the preſent average price of carriage, by the river from Burton to Gainſborough, is twelve ſhillings per ton ——	0	12	0
From Wilden to Gainſborough, a diſtance of about ninety miles, any quantity of goods will be conveyed at five ſhillings per ton	0	5	0
	0	7	0
Therefore from Burton to Wilden, or about nineteen miles and a half, the expence is ſeven ſhillings per ton —— ——	0	7	0
By the canal from Burton to Wilden, being about fifteen miles, the tonnage and wharfage for that diſtance, at three halfpence per ton per mile, amount to ——	0	1	10½

Freight,

	£.	s.	d.	£.	s.	d.
Brought forward ——	0	1	10½	0	7	0
Freight, at the rate of ſix-pence per ton for ten miles, is —— ——	0	0	9			
	0	2	7½	0	2	7½
Saving to the public, by extending the canal to Wilden, is four ſhillings and four-pence half-penny per ton				0	4	4½

It is therefore humbly ſubmitted to the legiſlature, all theſe circumſtances being conſidered, whether it would not be a very great injury to the public to fix the end of a canal, of ſuch length and immenſe importance as that from the Trent to the Merſey, in ſo bad a part of a river which is a monopoly, when it may ſo much more advantageouſly terminate in a better part of that river which is free.

And as an attempt has been made to defeat this noble undertaking by inſinuations, that it has not been ſufficiently digeſted, that it wants the requiſite notoriety, and by a notorious falſehood boldly aſſerted in print, that " A meeting at Wolſeley-bridge, held the 30th of December, was " the only one which preceded the application to parliament;" it will be requiſite, for the information of thoſe gentlemen who may not be acquainted with the ſubject, to ſtate a few plain facts, whereby they may judge what credit ought to be given to publications that contain ſuch glaring falſehoods.

A ſurvey of the greateſt part of this deſign was taken at the expence of the corporation of Liverpool, in the year 1755, and a plan of this ſurvey was engraved.

Another

Another ſurvey was made in 1758, and paid for by a ſubſcription in Staffordſhire.

In the ſame year a pamphlet on this ſubject was publiſhed in London, and diſperſed in thoſe parts of the country that were moſt likely to be affected by the execution of the plan; and many towns were made acquainted with it by perſonal applications.

In 1760 a public meeting was advertiſed and held at Sandon in Staffordſhire, at which Lord Gower, Mr. Anſon, and the gentlemen of the neighbouring counties attended, to conſider of the meaſures to be taken for carrying the plan into execution; and ſome difficulties ariſing at that time, the gentlemen deſired farther ſurveys might be made; and that they might be extended from tide-way to tide-way; and nearly one thouſand pounds was immediately ſubſcribed for that purpoſe.

The next public meeting by advertiſement was held the ſame year at Wolſeley-bridge, when another ſurvey was made, by Mr. Smeaton and Mr. Brindley, of that part of the intended canal between Wilden and Harecaſtle, which was ordered to be engraved, the other ſurveys not being completed; and copies of theſe plans were delivered to the land-owners and the neighbouring gentlemen.

By theſe means this deſign was already very generally made known, and expected to be carried into execution, as will particularly appear by the following fact:

About this time the former leaſe of the Burton navigation expired. The leſſee applied to the noble proprietor for a renewal of it; for which he demanded a ſum not much ſhort of four thouſand pounds. The leſſee offered three thouſand, on condition that, if the intended canal ſhould be made in ten years, one thouſand pounds of the money ſhould be returned. But the noble proprietor rather choſe to have a ſmall fine

certainly fixed, than to have any trouble about ſuch contingences: and as the leſſee did not comply with this propoſal, his lordſhip did actually grant a leaſe of the navigation to a new company, for a certain fine of two thouſand five hundred pounds, preferring this to being expoſed to the trouble of future applications and deductions, on account of any interfering extenſion; ſo that the leſſees may truly be ſaid to have received a compenſation already.

After more than ten years deliberation upon this ſubject, it was determined to make a vigorous attempt to carry the plan into execution: and ſome late exactions upon the Burton navigation, added to the delays and inconveniences attending that of the river Weaver, contributed not a little towards raiſing a proper ſpirit in the country for this purpoſe.

A meeting was therefore called, on the 20th of March 1765, and a ſubſcription begun towards the expence of the act; and it was ordered, that perſonal application ſhould be made to the gentlemen of Cheſhire, Liverpool, Birmingham, Litchfield, and other places, to inform them of this intention, and to deſire their concurrence and aſſiſtance; which was accordingly done. The commiſſioners of the Weaver navigation were waited upon, at their public meeting at Northwich, on the fourth of May following, and informed that it was intended to cut paſt that navigation; the reaſons for which were produced to them in writing, as was likewiſe a plan of the canal, ſo far as it could then be aſcertained; and they would much ſooner have had the ſatisfaction they now complain of not having received, if the ſurveyors had not been ſtopped by one of the commiſſioners, who abſolutely refuſed to permit them to proceed with their ſurvey.

The 13th of May, a public meeting by advertiſement was held at Newcaſtle in Staffordſhire; when further ſurveys were ordered to be made, and other neceſſary buſineſs to be done, and the commiſſioners

of

of the Weaver navigation ſent their treaſurer and clerk of the navigation to attend this meeting.

The next meeting was advertiſed for the 27th of June following at the ſame place. At this meeting the plan was agreed upon; the heads of the bill produced, read over, and approved; and near twenty thouſand pounds ſubſcribed, or promiſed to be advanced; and the reſult of this meeting was inſerted in the public papers.

Another pamphlet * was then publiſhed upon this ſubject, of which above a thouſand copies were ſold and diſtributed; and in this pamphlet the intended junction with the duke of Bridgewater's navigation was expreſsly mentioned.

The laſt general meeting on this occaſion was held on the 30th of December 1765, at Wolſeley-bridge, when what had been before done and determined on was approved and confirmed; and it was again unanimouſly agreed to petition for a canal from the river Trent, at Wilden Ferry, to the river Merſey.

It is not therefore for want of notoriety, or becauſe this ſcheme has not been ſufficiently digeſted, that it meets with oppoſition; but becauſe it has been too well digeſted, and offers the public more advantages than ſome individuals could wiſh, who would have been much better ſatisfied if the plan had been more defective.

Upon an impartial and comprehenſive view of the caſe, reſpecting the intended canal from the river Trent to the river Merſey, the friends

* A View of the Advantages of Inland Navigations; printed for Becket and De Hondt, in the Strand, and Johnſon and Davenport, Paternoſter-row; to which pamphlet I beg leave to refer for ample proofs of the utility of the intended canal from the river Trent to the river Merſey.

of

of that undertaking hope it will appear, that the great outlines of this deſign were ſketched above ten years ago; that the plan has received many improvements; and that the preference given to the terminations fixed by the bill, as it now ſtands, is ſupported by the cleareſt reaſons of public utility; that the execution of this plan will be a great, permanent, and public benefit to the agriculture and commerce of this kingdom; that it will reduce the price of carriage ſix ſhillings in eight, and thereby enable us to meet our commercial competitors at foreign markets, upon much better terms than we can at preſent; that it will greatly preſerve the public roads, and leſſen the expence of keeping them in repair; that it will moſt eſſentially advance the wealth and ſtrength of this nation, by increaſing the quantity of our home products and of our exports, and by finding employment for greater numbers of veſſels and ſeamen; that it will diffuſe a ſpirit of navigation through the very heart of the kingdom, and, by bringing many boys and youths from the inland counties towards the ſea-port towns, greatly increaſe the number of our ſailors; that it will find immediate and conſtant employment for vaſt numbers of people; and, laſtly, that it will have a tendency to prevent injurious monopolies of the neceſſaries of life, by opening ſo extenſive and cheap a communication between the interior parts of the kingdom and our manufacturing towns and ſea-ports; for the attempts of the moſt powerful monopolizer muſt certainly be ineffectual in a country where plenty can be thrown into any market, from all parts, by means of navigable canals.

I now propoſe to give the anſwer to what is here advanced, as I promiſed, and diſmiſs this account of the Trent and Merſey canal, to give the particulars of other navigations out of this great trunk.

Objections to Part of the propoſed Canal from Wilden Ferry to the Merſey, humbly ſubmitted to the true Friends to the Scheme " for " opening a Communication between Hull and Liverpool," who wiſh to confine this Canal to between Burton and Northwich, which will conſiderably haſten the Communication, relieve the Undertakers of Forty Thouſand Pounds Expence, protect Forty Thouſand Pounds Capital employed in the Burton and Northwich Navigations from Ruin, preſerve Thirty Miles of Land from Devaſtation, and completely anſwer all the real Purpoſes of public Utility.

GREAT pains have been uſed in printed pieces to inculcate a belief that the plan of the canal has not wanted public notoriety; that a ſurvey was taken in 1755, another in 1758, and a pamphlet publiſhed; a public meeting held in 1760 at Sandon in Staffordſhire, and other meetings in March, May, and June 1765; at the laſt of which the heads of a bill were produced.

Will the projectors dare to aſſert, that at any of theſe meetings, or even at the meeting at Wolſeley-bridge, in December (really and truly the only one which uſhered in this application to parliament), any idea was ſtarted of the company of proprietors participating with the duke of Bridgewater at Preſton Brook, or of the canals being declared to terminate at Runcorn Gap?

N. B. Many miles of land lying out of the courſe of the canal will be cut through without due notice, or any regular petition: a precedent deſerving the moſt jealous attention of parliament.

Of the project diſcloſed in this bill the notoriety entirely fails.

Nothing has been advanced to prove that the plan has been well digeſted,

digeſted, except in the title page of a paltry publication, intitled "Facts and Reaſons, &c." No attempt has been made to prove, that any actual ſurvey has been taken in order to appriſe the freeholders intereſted, or any calculation made of goods likely to be carried ſo as equitably to regulate the tonnage. Nay, if their accurate engineer is to be believed, their capital of one hundred and fifty thouſand pounds is unequal to the expence, and their ſcheme muſt be ruined; for though at one time he mentions one hundred and one thouſand pounds, and at another one hundred and thirty-three thouſand and eleven hundred pounds; yet the aggregate of his eſtimate given to the committee is one hundred fifty-eight thouſand one hundred twenty-five pounds, which happens to be eight thouſand one hundred twenty-five pounds more than the capital authoriſed to be raiſed by the bill.

Public utility does not require that the propoſed canal ſhould be extended beyond either Burton or Northwich, a communication between Liverpool and Hull (not Mancheſter) being the object of this bill.

It is therefore humbly ſubmitted to the legiſlature, whether it would not be a very great injury to the public, as well as an unneceſſary violation of private property, to ſuffer a canal to run nearly parallel for thirty miles with two good navigations, and to endanger a capital of forty thouſand pounds, when it might ſo much more advantageouſly terminate at Burton and Northwich, relieve the undertakers already unmercifully loaded, preſerve from depredation a fund from the Weaver navigation, which is ſacred to public uſes, ſecure thirty miles of land from grievous mutilation, and promote every conſideration of real public utility.

The following candid calculations deſerve attention:

	£.	s.	d.
By the river the preſent average price of carriage from Burton to Gainſborough is per ton	0	10	0
From Wilden to Gainſborough, where the navigation is allowed to be free, the average price is per ton	0	8	0
	0	2	0

Therefore from Burton to Wilden, about nineteen miles, the expence is per ton two ſhillings.

	£.	s.	d.	
By the canal from Burton to Wilden, being ſixteen miles, the tonnage may amount to	0	2	0	
Freight, upon an average, cannot be leſs than one penny per mile	0	1	4	
				0 3 4
Saving to the public, by ſtopping the canal at Burton, per ton				0 1 4

The Burton navigation is ſtigmatiſed as a monopoly: the preſent leſſees have not been engaged more than three years, and are not anſwerable for the miſconduct of their predeceſſor in 1749, or at any other period.

Let public indignation alight where it ought: they are anxious to meet every charge of inſolence or exaction. Armed with conſcious integrity, they appeal with confidence to the juſt tribunal of a Britiſh parliament.

By

	£.	s.	d.
By the canal tonnage from Witton-bridge to Runcorn, being fifteen miles, ten miles at three halfpence, and five at a penny per mile, is	0	1	8
Freightage at one penny per mile, for fifteen miles, is	0	1	3
Wharfage and tranſhipping at Runcorn	0	0	9
Freight from thence to Liverpool	0	2	0
	0	5	8
By the river the tonnage and freightage from Northwich to Liverpool do not upon an average exceed	0	4	0
So that here is a true ſaving by the river of one ſhilling and eight-pence per ton	0	1	8

The owners and truſtees of the old navigations beg leave to ſubmit, "That the tonnage collected by the company of proprietors ought to be "equal through the whole canal for every ſpecies of goods, with ſome "particular exceptions."

If the proprietors ſhould ſucceed in fixing different tolls on different ſpecies of goods, a dreadful extent of miſchief muſt follow, becauſe by impoſing a very low tonnage for all the ſtaple articles of the old navigations, they muſt neceſſarily be ſtripped of all their trade; and when theſe are irreparably deſtroyed, and every poſſibility of conteſt ceaſes, a friendly meeting of commiſſioners may raiſe, and even perpetuate, a tonnage at the higheſt prices which the act of parliament authoriſes.

The company of proprietors ought not to be formed into a company of navigators beyond a certain number. The neceſſity and utility of this proviſion are apparent at the firſt view. Proprietors of tolls, by

conſolidating

conſolidating tonnage and freightage in one charge, might take an inferior tonnage upon goods navigated by themſelves, and full tonnage upon all others; and would conſequently monopolize the freightage of the whole canal; for who could carry goods upon equal terms with thoſe who can make a conſiderable deduction in the lock dues?

It is ſuſpected, that the projectors do not entertain the chimerical idea of cutting through Harecaſtle; it is rather believed, that they are deſirous of cutting their canal at both ends, and of leaving the middle for the project of a future day. Are theſe projectors jealous of their honour? Let them adopt a clauſe (which reaſon and juſtice ſtrongly enforce) to reſtrain them from meddling with either end, till they have finiſhed their great trunk. This, and this alone, will ſhield them from ſuſpicion.

The old navigators are bound by every tie of duty to lay their appeal publicly before parliament; in whoſe wiſdom and juſtice they repeat their dutiful confidence.

The following calculation will ſhew, that the intended navigation, by a canal from the Trent to the Merſey, is in danger of becoming a monopoly.

The tonnage ſettled is not to exceed three halfpence per ton per mile.

A high tonnage is ever the parent of monopoly, which is proved by experience in other caſes.

The

	£.	s.	d.
The tonnage of three halfpence per mile, for every ten miles, is	0	1	3
Let it be ſuppoſed, every perſon carrying goods on this canal may do it upon an average at one penny per mile freightage, which, for ten miles, is	0	0	10
Total tonnage and freightage for ten miles is	0	2	1
Should the company of proprietors form themſelves into a company of navigators (ſuppoſing freightage the ſame as above), one penny per ton per mile for ten miles is	0	0	10
Out of this high tonnage it is very eaſy to foreſee that the proprietors may abate for what goods they carry one halfpenny per mile, which, for ten miles, will reduce the tonnage to	0	0	10
Total tonnage and freightage for ten miles, by the proprietors	0	1	8

This halfpenny abated from the tonnage is half the real value of the freight; and therefore it will be impoſſible for any other navigator to carry goods, in oppoſition to the company of proprietors, under an embargo of fifty per cent. But, all competition being deſtroyed, they may raiſe the price of carriage without limitation.

Will not this be a monopoly of the firſt rate?

To remedy this glaring evil, it is propoſed, that the company of proprietors may, by a ſhort clauſe, be reſtrained from acting as an united company of navigators; without, however, prohibiting every individual of them from being a navigator, or any number as partners, not more than three,

four, or five, for the ſubdivided partnerſhips will rival each other, and the public by that means be ſecured.

If thoſe who act for the company of proprietors of the intended canal have no deſign of a monopoly, they will not object to ſuch a reſtraining clauſe. If they do, the concluſion neceſſarily follows.

It ought to be a fundamental rule in all public navigation bills, to keep ſeparate and independent the offices of undertaker and navigator, as the conjunction of thoſe offices is always found to be the principal, if not only, cauſe of monopoly.

During the above conteſt a bill was brought into parliament by the Cheſhire gentlemen, in order to eſtabliſh the Macclesfield canal: it paſſed the Houſe of Commons, but was diſmiſſed by the Lords. Another bill, for leave to cut a navigation from Wilden Ferry to the duke of Bridgewater's canal at Preſton Brook, and from thence, jointly, to be carried on to the river Merſey, at or near Runcorn Gap, paſſed both houſes of parliament; as did a third bill for cutting a navigable canal from the river Severn, between Bewdley and Titton Brook, in Worceſterſhire, to croſs the river Trent, at or near Haywood Mill in Staffordſhire (called the Wolverhampton canal, and which I have particularly treated upon in the former part of this work, page 175) and to communicate with a canal intended to be made between the ſaid river Trent, and the river Merſey.

CHAP. X.

Coventry and Oxford Canals, from the Grand Trunk of the Trent and Merſey Canal at Fradley Heath, into the River Thames at Oxford.—Extent and Courſe of the Canal through the Counties of Stafford, Warwick, and Oxford—Its Width, Depth, Riſe, and Falls of Water.—Extracts from the different Acts paſſed for making this Canal—Its general Utility to Trade, Manufactures, and Commerce.—Birmingham and Fazely Canal, which joins the former Canal.—Extract of the Acts of Parliament for conſolidating the Proprietors into one Company.—Aqueduct at Fazeley.—Collateral Cuts from Birmingham to Digbeth and the Coal Mines.—Canal cut from near Newcaſtle under Line to Froghall, and Caldenloe Coal Mines and Lime-ſtone Quarries.—Stroudwater Canal to the Severn.—Droitwich Canal.—Account of the Thames and Severn Navigation, and the Junction of thoſe Rivers by Means of a Canal from Leachlade to Stroud.—Short Extract from the Acts obtained for making this Junction.—A Canal to join the Thames and Severn projected in the Reign of Charles II.—Extenſive Trade carried on by this and the Coventry and Oxford Canals.

COVENTRY CANAL TO OXFORD.

A MEETING was held at Banbury on the 3d of October 1768, and alſo again on the 25th of the ſame month, to take into conſideration propoſals for making a canal from the city of Coventry into the river Thames at the city of Oxford; which meeting was attended by a great number of noblemen, gentlemen, land-owners, merchants, and

capital manufacturers, not only of the county of Oxford, but alſo of the neighbouring counties; among whom were the dukes of Marlborough and Buccleugh, the lords Spencer, Guildford, and North, the Vice Chancellor, and ſeveral of the heads of houſes, the two members for the univerſity, with many other gentlemen of great weight and conſequence, as well as the corporations of Oxford, Woodſtock, Banbury, and Coventry; and upon the great and important queſtion of a navigable canal projected by Mr. Brindley to be cut from Coventry to Oxford, the company preſent were perfectly unanimous with reſpect to the utility of the deſign, and ſhewed an uncommon alacrity in raiſing the money to carry it into execution; at the ſame time expreſſing their moſt ſanguine wiſhes for the ſucceſs of the undertaking.

It was propoſed to make this navigable canal to communicate with the canal now making from the city of Coventry to the great Staffordſhire navigation, which joins the main trunk at Litchfield. The canal is intended to paſs through the ſeveral pariſhes, hamlets, or places of Stoke, Binley, Comb, Brinklow, Long Lawford, Newbold, Brownſover, Clifton, Hilmorton, Barby, Willoughby, Braurſton, Wolfthamcote, Lower Shuckburgh, Napton, Priors Marſton, Priors Hardwick, Wormleighton, Fenny Compton, Burton, Daſſett, Warmington, Shotwell, Mollington, Horley, Nethorpe, and Banbury; and from thence through Adderbury, Deddington, North Aſton, Middle Aſton, Steeple Aſton, Rouſham, Shipton, Woodſtock, Bladen, Begbrook, Yarnton, and Midvercot, to the city of Oxford, to communicate with the navigation of the river Thames, which places had been ſurveyed by Mr. Brindley, and the undertaking found to be practicable.

The ſenſe of the county being known by the above meeting, Mr. Brindley's report and propoſals were taken into conſideration, and it was determined to apply immediately to parliament for permiſſion to carry this great deſign into execution, a deſign of the moſt general and extenſive utility to the public at large, and highly conducive to the particular benefit of the counties of Warwick, Northampton, and Oxford.

It was alſo reſolved, that ſhould the application to parliament be crowned with ſucceſs (of which no doubt could be entertained), the undertaking ſhould be veſted in a company ſubſcribing according to certain rules, and receiving profits agreeable to other navigation acts lately publiſhed.

Upwards of fifty thouſand pounds was inſtantly ſubſcribed by the company then preſent, for the immediate ſupport and promotion of the project; and Mr. Dadley, of Coventry, and Mr. Walker, town clerk of Oxford, were ordered to prepare and ſolicit the bill, and ſubſcriptions for the reſidue of the ſum to be raiſed were ſoon after completed.

By the Coventry act fifty thouſand pounds is the original ſum to be raiſed. This ſum is divided into five hundred ſhares of one hundred pounds each. The ſhares are made perſonal eſtate, and are transferable as ſuch. The money ſubſcribed in ſhares is made payable by different calls or inſtalments; and no call is to exceed ten per cent. at any one time, and between every call to that amount there muſt be an interval of three months. The facility of payment under this proviſion need not be enlarged upon. An intereſt of five pounds per cent. regularly paid at a ſtated day in every year, attends the ſum advanced upon every call; and when the whole navigation is completed, every proprietor becomes entitled to a ſhare of the full profits, anſwerable to the number of ſhares he may be poſſeſſed of.

The promiſing ſtate of the Cheſhire and Staffordſhire navigations encouraged the gentlemen of Warwickſhire to ſet on foot another branch of inland navigation, which is now cutting, and which will extend from the grand trunk at Fradley Heath, in the county of Stafford, to the city of Coventry, to join that canal which is cutting into the river Thames at Oxford; and it is propoſed to carry on the ſame from Coventry by the town of Warwick to Stratford upon Avon.

An act has been obtained for the completion of that part of this canal which goes to the city of Coventry, joins the canal to Oxford, and falls into the Thames there; and the canal is finiſhed, which has enabled the proprietors ſpecified in the act to cut through the different pariſhes, hamlets, and places of Fradley, near Litchfield, Streethay, Huddlesford, Whittington, Hoppas, Bonehill, Fazeley, Tamworth, Ammington, Poleſworth, Grindon, Dordon, Merivale, Atherſtone, Mancetter, Hartſhill, Nuneaton, Coton, Bedſworth, Exhall, Longford, Foleſhill, to the city of Coventry, with branches out of the ſaid canal to the ſeveral coal-works which lie in its route.

This canal from Fradley Heath to Coventry was begun in 1768, and but ſmall progreſs was made in it for ſome time, when it was found abſolutely neceſſary, on account of other cuts requiſite to be made to different towns and villages, and alſo to ſome collieries in the neighbourhood of this canal, to apply again to parliament, which was done in the year 1784, to explain and amend the former acts; and alſo to incorporate in one the different companies, and connect the different canals.

The act obtained in conſequence of this application is intitled, An Act to enable the Company of Proprietors of the Navigation from the Trent to the Merſey, and the Company of Proprietors of the Navigation from Birmingham to Fazely, to make a navigable Canal from the ſaid Trent and Merſey Navigation on Fradley Heath in the County of Stafford, to Fazeley in the ſaid County; and for confirming certain Articles of Agreement entered into between the ſaid Trent and Merſey, the Oxford, and the Coventry Canal Navigation Companies.—The Preamble is as follows:

WHEREAS by an act made in the ſixth year of the reign of his preſent majeſty, intitled, An Act for making a navigable cut or canal from

from the river Trent, at or near Wilden Ferry, in the county of Derby, to the river Merſey, at or near Runcorn Gap, certain perſons therein named were united into one body politic and corporate, by the name of the Company of Proprietors of the Navigation from the Trent to the Merſey; and were authoriſed and impowered, by the ways and means therein mentioned, to make, complete, and maintain, a navigable cut or canal, paſſable for boats, barges, and other veſſels, from the river Trent, below an ancient ferry, called Wilden Ferry, in the county of Derby, to the river Merſey, at or near Runcorn Gap; and ſeveral commiſſioners were appointed by the ſaid act for putting the ſeveral powers thereby veſted in them in execution: And whereas the ſaid company have, in purſuance of the ſaid act, and of another act paſſed in the tenth year of the reign of his ſaid preſent majeſty, for amending the ſaid act of the ſixth year of his ſaid majeſty, and of another act paſſed in the fifteenth year of his preſent majeſty, for amending and rendering more effectual the ſaid two former acts, made and completed the whole of the ſaid navigation from the Trent to the Merſey, and the other works authoriſed by the ſaid firſt mentioned act: And whereas by an act made in the ſixteenth year of the reign of his preſent majeſty, intitled, An Act to enable the company of proprietors of the navigation from the Trent to the Merſey, to make a navigable canal from the ſaid navigation on the ſouth-ſide of Harecaſtle, in the county of Stafford to Froghall, and a rail-way from thence to or near Caldon, in the ſaid county, and to make other rail-ways; the ſaid company were authoriſed and impowered, by the ways and means therein mentioned, to make, complete, and maintain a navigable cut and canal from the ſaid canal ſo made and completed on the ſouth-ſide of Harecaſtle, in the county of Stafford, to Froghall; and from thence to complete and maintain a rail-way for the conveyance of coals, ſtone, and other goods to or near ſeveral lime-works and lime-ſtone quarries, at or near Caldon, in the ſaid county of Stafford, which they alſo have made and completed: And whereas by another act made in the twenty-third year of the reign of his preſent majeſty, for amending and rendering

more

more effectual the ſaid acts of the ſixth, tenth, fifteenth, and ſixteenth years of the reign of his preſent majeſty, it is enacted, that the ſaid canals, undertakings, and premiſes ſo begun and completed as aforeſaid, ſhall from thenceforth be united and conſolidated, and ſhall be and become, and forever thereafter continue and remain, one joint concern and undertaking in the ſaid company of proprietors, and managed and conducted as ſuch by them the ſaid company; and that the ſaid ſeveral navigations, undertakings, and premiſes, ſhall ſtand, be, and remain collateral ſecurities to each other for the ſeveral ſums borrowed and ſecured upon each of them, and for the intereſt of the ſame reſpectively, ſubject nevertheleſs to the ſeveral and reſpective ſums originally borrowed and ſecured, or due upon each of them, and the intereſt thereof reſpectively: And whereas, by an act made in the eighth year of the reign of his preſent majeſty, intitled, An Act for making and maintaining a navigable canal from the city of Coventry, to communicate upon Fradley Heath, in the county of Stafford, with the canal now making between the Trent and Merſey, certain perſons therein named were united into one body politic and corporate, by the name of the Company of Proprietors of the Coventry Canal Navigation, and were authoriſed and impowered, by ways and means therein-mentioned, to make, complete, and maintain a cut or canal navigable and paſſable for boats, barges, and other veſſels, from the ſaid city of Coventry, to communicate, upon Fradley Heath aforeſaid, with the ſaid canal between the rivers Trent and Merſey; and commiſſioners were appointed by the ſaid act for putting in execution the ſeveral powers thereby veſted in them: And whereas the ſaid cut or canal, ſo authoriſed to be made by the laſt recited act, hath been made and completed only from Coventry aforeſaid to Atherſtone, in the ſaid county of Warwick, and the reſidue thereof remains yet to be executed: And whereas by an act made in the ninth year of the reign of his preſent majeſty, intitled, An Act for making and maintaining a navigable canal from the Coventry canal navigation to the city of Oxford, certain perſons therein named were united into one body politic and corporate, by the name of the Company

of

of Proprietors of the Oxford Canal Navigation, and were authorifed and impowered by the ways and means therein mentioned to make, complete, and maintain a cut or canal navigable and paſſable for boats, barges, and other veſſels from the Coventry canal navigation to the city of Oxford; and commiſſioners were appointed by the ſaid act for putting in execution the ſeveral powers thereby veſted in them: And whereas the ſaid canal ſo authoriſed to be made by the laſt-recited act hath been made and completed only from the ſaid Coventry canal to Banbury in the county of Oxford, and the reſidue thereof remains yet to be executed: And whereas at a meeting held at Coleſhill, in the county of Warwick, upon the 20th of June 1782, by certain delegates from the ſaid company of proprietors of the navigation from the Trent to the Merſey, from the ſaid proprietors of the Oxford canal navigation, and from the ſaid company of proprietors of the Coventry canal navigation, and alſo from certain ſubſcribers to a new propoſed navigation from the collieries in the neighbourhood of Wedneſbury to Birmingham, and from thence to join the Coventry canal near Fazely, it was agreed by ſuch delegates on the part of their reſpective companies or conſtituents, that, in order to effect a general communication between the Oxford and Coventry canals, and the canal from the Trent to the Merſey (therein called the Grand Trunk Canal), and the collieries in the neighbourhood of Wedneſbury and town of Birmingham, it would be neceſſary that the Coventry canal ſhould be completed between Atherſtone and Fradley Heath; that the Oxford canal ſhould be completed from Oxford to Banbury; and that the new ſubſcribers ſhould execute a canal from ſuch coal-mines to Birmingham and Fazeley: And the more eaſily to effect the communication between Fazeley and Fradley Heath, it was further agreed, that the ſaid company of proprietors of the Coventry canal navigation ſhould, by authority of parliament, or otherwiſe, relinquiſh to the company of proprietors of the Trent and Merſey navigation, and to the ſubſcribers to ſuch propoſed canal, that part or portion of their undertaking which lies between Fazeley, in the county of Stafford, and the ſaid Trent and Merſey navigation on Fradley

Fradley Heath, in the ſame county; and that the ſame ſhould be executed by them at their joint expence; the ſubſcribers to ſuch new canal allowing to the ſaid company of proprietors of the Trent and Merſey navigation five hundred pounds, as a conſideration for ſuperintending and directing the execution of ſuch branch of the canal: and it was further agreed, that the profits ariſing therefrom ſhould be divided in manner following: *videlicet*, The profits ariſing upon the half part thereof, from Fazeley towards Fradley Heath, amongſt the ſubſcribers to the ſaid new canal, and the profits ariſing from the other half part from Fradley Heath towards Fazeley, amongſt the proprietors of the navigation from the Trent to the Merſey; and that when the ſame ſhould be completed, it ſhould be equally divided between, and each part conſidered as the ſeveral and diſtinct property of the ſaid parties, and be ſupported accordingly: and it was therein expreſſed to be further underſtood and agreed, that the tonnage, to be taken for all coals navigated from Birmingham throughout the intended canal to Fazeley, and upon all or any part or parts of the Coventry and Oxford canals, ſhould not exceed one penny per ton per mile; but it was therein expreſſed to be underſtood, that the ſubſcribers to the ſaid intended canal were not to be reſtrained from taking any additional tonnage for all coals paſſing from the collieries and diſcharged at Birmingham, or at any diſtance upon the intended canal ſhort of Fazeley; and by an act paſſed in the twenty-third year of his preſent majeſty's reign, for making, among other works, a navigable canal from Birmingham, to join the ſaid Coventry canal at or near Fazeley, it is declared: That the works to be done by the company of proprietors thereby incorporated had been ſubſtituted in the place and ſtead of thoſe intended to be done by the ſubſcribers to the ſaid new propoſed canal as before-mentioned; and the ſaid agreement ſo entered into by the ſaid ſubſcribers, was by the ſaid act enacted and declared to be binding and concluſive upon the ſaid new company, fully and effectually to all intents and purpoſes.

The act then proceeds to impower the company for the Trent and Merſey canal to execute the part of the canal allotted to them; extends the

the act of the eighth of George III. to the works to be executed by this act; conſolidates this undertaking with the Trent and Merſey navigations; impowers the companies of proprietors of the Trent and Merſey canal, and the Birmingham and Fazeley navigation, to collect the ſame tolls on their reſpective parts of the ſaid canal from Fazeley to Fradley Heath, as were granted to the Coventry company. It alſo impowers the company of proprietors of the Trent and Merſey navigation to borrow ten thouſand pounds, and to aſſign the tolls as a ſecurity; enacts the form of the aſſignments, which are to be transferable; ſtates in what manner the expences of the act are to be repaid; recites the articles of agreement between the grand trunk and Coventry canal companies, which agreement it confirms; provides for equalizing the tonnage of coals upon the Oxford and Coventry canals; and declares the act a public act.

The courſe of theſe canals has been given before. I have now to give the lengths, &c. From the grand trunk at Fradley Heath to Coventry, with a branch to the coal-mine, is thirty-ſeven miles, and all the way upon a level; and from the city of Coventry to the city of Oxford into the river Thames the length is eighty-one miles ſeven furlongs thirteen chains, with a riſe of eighty-eight feet from Hillmorton to Naptonfield, being ſeventeen miles; all the reſt of the way is level.

BIRMINGHAM AND FAZELEY CANAL.

IN 1785 an act of parliament was obtained to enable the company of proprietors of the navigation from the Trent to the Merſey, and the company of proprietors of the navigation from Birmingham to Fazeley, to make a navigable canal from the ſaid Trent and Merſey navigation on Fradley Heath, in the county of Stafford, to Fazeley, in the ſaid county, and for confirming certain articles of agreement entered into between the ſaid Trent and Merſey, the Oxford, and the Coventry canal companies. The act contains firſt a recital of the act of 6 Geo. III.

for making a canal from the Trent to the Merſey; and alſo of the act of the 16 Geo. III. for making a branch to Froghall and Caldon for the conveyance of coals, ſtone and other goods, and to and near ſeveral lime works and lime-ſtone quarries which are at or near Caldon in the county of Stafford, which branch has been made and completed. It alſo recites another act paſſed 23 Geo. III. for conſolidating the ſaid canals, and an act of 8 Geo. III. for making a canal from Coventry to join the firſt-mentioned canal on Fradley Heath. It alſo recites another act of 9 Geo. III. for making a canal from Coventry to Oxford, and an agreement of the delegates from the ſaid companies at Coleſhill in the county of Warwick, on the 20th June 1782. Then follows a part of act of 23 Geo. III. for making the canal from Birmingham to Fazeley, and for ratifying the articles of agreement of delegates, dated 29 Oct. 1783, whereby the ſaid portion of canal is divided between the ſaid two companies.

After numerous other articles unneceſſary to mention, this undertaking is declared conſolidated with the others of the Trent and Merſey navigation, and the proprietors are impowered to borrow ten thouſand pounds, and aſſign the tolls as ſecurity; and after reciting the articles of the agreement between the grand trunk and Coventry canal companies of the 29th of Oct. 1783, and confirming the ſaid agreement, and providing for equalizing the tonnage of coals upon the Oxford and Coventry canal, the act is declared to be a public act.

On the 12th of July 1790 the aqueduct acroſs the river Tame at Fazeley, in the county of Stafford, was finiſhed; and the Coventry canal, with the grand trunk, and Birmingham and Fazeley navigations, completed, and thereby the long deſired communications by inland navigation between the ports of London, Briſtol, Liverpool, and Hull, are completely opened.

The

The length of this canal, from Birmingham to Fazeley, is ſixteen miles and eighteen chains: it has a fall of two hundred and eighty-four feet. This includes the collateral cut to Digbeth. The length of the canal from the grand trunk at Stoke, near Newcaſtle, to Froghall and Caldon coal-pits and lime-ſtone quarries, is nineteen miles three furlongs eighteen chains, with a riſe of ſeventy-five feet in the firſt ſix miles and three quarters to Stanley Moſs; and a fall of ſixty feet ten inches, the remainder of the way to the coal-pits and lime-quarries. Another canal has alſo been cut at Birmingham, from Rider's Green to Broadwater fire-engine coal mines, being two miles and a half and ſix chains, with a fall of forty-ſix feet.

STROUD CANAL INTO THE SEVERN.

An Account of the navigable Canal from the Town of Stroud in Glouceſterſhire to the River Severn at Fremiload.

THE plan for making the river of Stroudwater navigable was firſt formed, and an act of parliament obtained for carrying it into execution, in the year 1730; but though this undertaking was promoted with great ſpirit, whether from the want of money or ſome miſunderſtanding among thoſe engaged in it, or on account of the ſuppoſed loſs of water to the millers, it was never completed.

In the year 1755 a new ſurvey and an eſtimate of the expence of making the ſaid river navigable were ordered; but another ſcheme was ſoon afterwards propoſed by four private gentlemen to undertake the work at their own expence, without locks (and conſequently without any loſs of water to the millers), by ſhifting the cargoes into boxes, and at every mill into other boats by means of cranes. This propoſal was preferred and accepted; and in the year 1759 an act was obtained

for executing it. But this ſcheme likewiſe, which did not promiſe much benefit to the country, in the end totally miſcarried, and the projectors were nearly ruined.

In the year 1774, when many canal navigations had been ſucceſſfully planned and completed in different parts of the kingdom, the project was again revived of effecting the navigation of the Stroudwater to the river Severn by a new canal. New ſurveys were in conſequence taken, plans drawn, and eſtimates made by Thomas Yeoman, engineer, F. R. S. and other ſurveyors, after the manner of the moſt improved inland navigations, whereby the old river is as much as poſſible avoided, and the interference with the mills, which has always been an obſtacle, very much prevented, as the canal communicates with the river only in three places.

When an act had been obtained, which granted ſufficient powers to complete the work, a ſubſcription was opened for twenty thouſand pounds, divided into two hundred ſhares, which was very ſoon filled. Articles were executed, ſtating the rights and powers of the proprietors; calls were made upon the ſubſcribers agreeably to the articles; lands were purchaſed, and materials provided. Thus the navigation went on ſmoothly and expeditiouſly; but certain land-holders, through whoſe lands the line of this navigation muſt paſs, obſtinately oppoſed it. They were joined by a few mill-holders upon the river. Theſe perſons advertiſed meetings, at which they opened a ſubſcription, and raiſed a fund profeſſedly to be ſpent in oppoſition to the navigation; in conſequence of which an action was laid by a mill-holder at Framiload, for cutting through a ſmall piece of ground, which it was his intereſt to prevent. The court of Exchequer was moved to ſtop proceedings on the canal, and the queſtion was brought to an iſſue at the Glouceſter aſſizes, when it was determined, that a canal navigation as this was deemed (though falſely, as it communicates with the river in three places) could not be made under the powers of the act of 1730, notwithſtanding

withſtanding the words of the act were, " That the undertakers are " impowered to make as many new cuts as they may judge proper, " and of what length and breadth they ſhall think convenient."

In conſequence of this determination another act was applied for, and obtained in 1775, under which the work is now finiſhed, and will prove of very great advantage to the country.

The courſe of this canal begins at Bad Brook, at the edge of the town of Stroud, paſſes on to Cain's Croſs by Ebley, and acroſs the main road at Stone Croſs, and by Stone Houſe, near Rycott Mill, and to Lockham bridge; croſſes the river near Whitminſter Mill, and goes into the river Severn at Framiload, being in length ſomething more than eight miles, and falls one hundred and two feet.

It may not be improper to give here a brief deſcription of the cranes and engines made uſe of in the year 1775, by the four gentlemen who undertook to carry on the navigation without locks.

Theſe cranes were invented by Mr. Bridge of Tewkſbury, in the county of Glouceſter. He conſidered the mill-ponds, where there are any, as ſo many navigations already prepared. If they were good, he did not make them worſe; but if they were bad, he made them better, by widening and lengthening them, in order that they might hold more water.

A boat being ſuppoſed to ſwim in this canal or reſervoir above the mill, the queſtion is, how ſhall the lading of ſuch a boat be got into the ſtream below the mill, or *vice verſâ*, without the intervention of a lock or locks?—The method taken by him for compaſſing this end was as follows:

He cut a ſmall canal from the water below the mill, to approach towards

wards the mill or pond above the mill; but kept the upper and lower canal entirely aſunder, by means of a ſtrong bank or wall, about twelve feet thick.

On this bank he erected a crane, or rather a double crane, for it has two necks or levers; and he cauſed them to act either ſingly or jointly at pleaſure. Theſe necks or levers are made to turn to either the upper or lower canal, as they are wanted; and when they both turn the ſame way, they generally act as a balance or ſcales.

He next proceeded to conſtruct a boat on the lower canal, exactly of the ſame dimenſions with that in the upper; and in both theſe boats he placed ſix, ſeven, eight, or more frames, capable of holding about one ton weight of goods each, and of being lifted up by means of ſtrong hooks, with all the goods upon them.

Matters being thus ſettled, two men (the boatmen) begin to work the cranes; and then the lever of one crane takes a frame, with all the goods on it, out of one boat, while the other lever is doing the like by the other frame out of the other boat; and after the necks of the cranes are turned about, they interchangeably depoſit their contents; both boats being by this means loaded and unloaded at the ſame time.

Here we may obſerve there is no expence of locks, no damages ariſing from floods, or freſhes, or froſts, or the concuſſion of the water; nor is there any the leaſt waſte of water; ſo that the ſmalleſt land drain, if enough to ſupply a canal in a gentleman's garden, is hereby rendered fully adequate to all the purpoſes of an inland navigation; and when any part of the machine happens to be out of order, it is as eaſily repaired in winter as in ſummer. Not to mention, that as the crane is a double one, one part may ſerve (only uſing double the time), although the other ſhould be broken. Beſides, ſince all the cranes on the river are of a ſimilar conſtruction, materials for repairing them, ſuch

ſuch as beams, wheels, pulleys, chains, ropes, &c. may always be kept in readineſs; ſo that the whole may be repaired in a few hours. Moreover, as to the difficulties attending heights, falls, or precipices, it is no great difference in the preſent caſe, whether the goods are to be lowered down or raiſed up four feet only, or twenty-four. And as to the important article of diſpatch, it can be aſſerted as a certain fact, which is every day confirmed by experience, that both boats will interchange their reſpective loadings in leſs than half an hour.

But to ſet this ſcheme in its true light, I have extracted from a long laboured performance in its favour, and the anſwer to it, the following ſhort unanſwerable evidence to prove its inſufficiency.

	H.	M.	S.
The time in making a complete trip and retrip with a forty ton barge, ſuppoſed to be in towing ——	8	22	50
The time to paſs and repaſs the twenty locks, at two minutes each lock, proved to be ſufficient by obſervation, as well as calculation —— ——	1	20	0
	9	42	50
The time to make a trip and retrip by the ten ton crane boat, all circumſtances being alike, will be found, towing the ſame as before —— ——	8	22	50
The time to paſs and repaſs at the twenty mills or falls, allowing half an hour at each crane up and down, will be	20	0	0
	28	22	50

Difference of time is nineteen hours almoſt out of twenty-eight hours.

To

To compare the expence, ſuppoſe the towing labour comes to eighteen pence a day per man for twelve hours work, the expence of two men for nine hours forty minutes fifty ſeconds, in making a complete trip and retrip in the forty ton barge, only —— —— £. 0 2 4

The ten ton boat, to make the ſame trip and retrip, will require, on account of the working the cranes, two men's labour for twenty-eight hours twenty-two minutes fifty ſeconds, which comes to ſeven ſhillings one penny per trip and retrip, and according to the ſame rate forty tons for the labour of freight only come to —— 1 8 4

The difference, being an extra charge by the crane or new ſcheme navigation for forty tons freight in every complete voyage up and down the navigation —— 1 6 0

From this calculation it plainly appears, that the new ſcheme has a diſadvantage of nearly 1115 l. per cent. and the ſame diſadvantage will proportionably ariſe on any other extent of navigation. Hence it is evident, that the judgment of the legiſlature was right in veſting as it did all the advantage of an invention, which might not ſeem to them to carry that ſame proſpect of utility, as it did to the proprietors of the machine navigation on the river Stroud.

DROITWICH CANAL.

An Account of Droitwich Canal into the Severn.

THE courſe of this canal begins in the town of Droitwich, and county of Worceſter, and near Appletree Hill, whence it proceeds to Bryer's Mill, and over Falſham-Pill Brook to Salwarp, over Martin Brook by Hill End, through Ladywood, over Atterburn Brook, by Jacob's Ladder and Hawfordrough to Hill Top, and croſs the road from Kidderminſter to Worceſter, by Hawford Houſe into the river Severn, near the place where the little river Salway goes out of the Severn,

being a navigable courſe of five miles and five furlongs, and a fall of fifty-ſix feet ſix inches. The particulars of the trade, manufactures, and produce I have before given at large, when treating of the courſe of the intended navigations ſince executed for joining the rivers Severn, Trent, and Merſey, and opening a communication between the ports of Liverpool, Briſtol, and Hull.

A ſhort digreſſion, and brief deſcription of the river Severn, I hope will be acceptable to my readers; ſome of whom may not have an idea of the great trade carried on upon it, which has been an inducement for canals to be cut at every part poſſible to carry the manufactures and produce of the interior counties by water to Briſtol, where they are ſure of a market for the moſt valuable cargoes.

This river has its ſource from a large bog on the top of Plinlimmon, a mountain in Montgomeryſhire in North Wales; from whence, ruſhing down with a ſwift current, and being joined by many leſſer torrents, it preſently appears conſiderable; and paſſing by Llanydlos and Newtown becomes navigable near Welchpool, where the river Vernew joins it, with a ſtream very little inferior to its own; from thence proceeding gently forward to Shrewſbury, which it ſurrounds nearly in the form of a horſe-ſhoe, it flows on through a rich vale, with many extenſive windings, till it comes to Benthall Edge, by the way receiving into it the river Terne, which waters all the north of Shropſhire. Here the Severn begins to be rapid, being pent up between two oppoſite hills, both very lofty and ſteep; and from thence to Bridgenorth and Bewdley the channel is confined by high woody banks and rocky cliffs, which afford variety of beautiful proſpects. Afterwards it again glides pleaſantly on through the fruitful plains of Worceſterſhire, viſiting in its way the city itſelf, and a little below is conſiderably augmented by the influx of the river Terne. This addition, however, is much inferior to that which it receives from its junction with the river Avon at Tewkſbury, which is navigable up to Perſhore, Eveſham, and

Stratford. Theſe two rivers thus united purſue their courſe to Glouceſter, and about fifty miles below that city the name of the Severn is loſt in the Briſtol Channel.

This river being juſtly eſteemed the ſecond in Britain, is of great importance, being navigated by veſſels of large burthen more than one hundred and ſixty miles from the ſea, without the aſſiſtance of any lock. Upwards of one hundred thouſand tons of coals are annually ſhipped from the collieries about Madeley and Broſeley, for the cities and towns ſituate on its banks, and thence conveyed into the adjacent countries. Great quantities of grain, pig and bar iron, iron manufactures, and earthen-ware, as well as wool, hops, cyder, and proviſions, are likewiſe continually ſent to Briſtol, and other places, from whence various kinds of goods are brought in return. The freight from Shrewſbury to Briſtol is about ten ſhillings per ton, and from Briſtol to Shrewſbury it is fifteen ſhillings per ton. The rates to the intermediate towns are in proportion.

This traffic is carried on with veſſels of two ſorts: the leſſer ſort are called barges and frigates, being from forty to ſixty feet in length, having a ſingle maſt and ſquare-ſail, and carrying from twenty to forty tons burthen. The trows, or larger veſſels, are from forty to eighty tons burthen. Theſe have a main and top maſt, about eighty feet high, with ſquare-ſails, and ſome have mizen-maſts: they are generally from ſixteen to twenty feet wide, and ſixty in length, being when new and completely rigged worth about three hundred pounds.

In May 1756 the number of barges and trows on the river Severn, navigating from Welchpool and Poolſtake downwards to Briſtol, amounted to three hundred and ſeventy-ſix, and ſince that time by the addition of the inland canals from the Trent, the Merſey, and the Thames, into the Stroud navigation, it may be fairly calculated, that not leſs than double that number are now employed. Theſe are navigated

gated by three or four, and ſome by ſix or eight men, who are generally hardy, robuſt, and reſolute; ſo that this navigation may be eſteemed a valuable nurſery for ſeamen.

So favourable an idea was entertained by the citizens of London of the utility of the junction of the Thames to the Severn, that if its completion had called for a million inſtead of one hundred and thirty thouſand pounds, the fund would have been preſently ſubſcribed. The connections of one mercantile houſe alone ſubſcribed twenty-three thouſand pounds, and ſeveral others ten thouſand pounds each.

JUNCTION OF THE THAMES AND THE SEVERN.

Particulars of the Junction of the River Thames with the River Severn at Stroud; and alſo a collateral Cut from the ſaid Canal, at or near Siddington, to or near the Town of Cirenceſter, in the Counties of Gloucester and Wilts: Extracted from the Act of Parliament obtained in 1783.

WHEREAS the making and maintaining a canal, with a proper collateral cut for the navigation of boats, barges, and other veſſels from the river Thames or Iſis, at ſome place at or near Leachlade in the county of Glouceſter, to join and communicate with a navigable cut or canal now made between the town of Stroud and the river Severn, in the ſaid county of Glouceſter, will open an eaſy communication between the interior parts of the kingdom and the port of London, which will be of great advantage to many of the ſea-ports of this kingdom, and to ſeveral different manufactories in the interior parts of the kingdom, and will afford a ſupply of coals to thoſe parts of the country, through which the intended canal and collateral cut are propoſed to be made; and will alſo be of great public utility: And whereas the ſeveral perſons hereinafter particularly named are deſirous, at their own proper coſts and charges, to begin, carry on, complete, and maintain the ſaid navi-

gable canal and collateral cut, intended to be made by virtue of this act; but the ſame cannot be effected without the aid and authority of parliament: wherefore for obtaining and perfecting the good ends and purpoſes aforeſaid, &c. &c. &c.

The proprietors are incorporated with the uſual powers. Not to uſe the ſprings at Sapperton but under Lord Bathurſt's direction; to carry a feeder through Lord Bathurſt's gardens; and lay a water-pipe from the feeder into Lord Bathurſt's manſion-houſe. Lands may be entered to make a ſurvey. Levels and ſurveys to be taken, and entered into a book of reference. Two parts to be made thereof, and authenticated by the ſpeaker of the Houſe of Commons, and allowed to be given in evidence. Canal and cut not to deviate more than ſixty yards from the courſe in the plan. Land-owners, being omitted in the book of reference, not to obſtruct the making the canal and cut. The line of the canal through Mr. Eliot's lands deſcribed, and through ſeveral yards and gardens. Breadth of the canal and towing-paths. Bodies politic, &c. impowered to ſell and convey lands. Satisfaction to be made in groſs, or by annual rent. If rents, &c. are not regularly paid, how to be recovered. Copyhold rights to be preſerved. Commiſſioners appointed, who ſhall determine differences, and ſettle recompences. If parties refuſe to ſubmit to, or are diſſatisfied with the determination of the commiſſioners, or refuſe to accept the purchaſe money, or to treat, or ſhall not agree, a jury ſhall be impannelled to aſſeſs the purchaſe moneys or recompence. Witneſſes may be examined on oath. Jury to aſſeſs damages. Verdict of the jury, &c. to be final. Sheriff, &c. making default to forfeit five pounds. Juries under the ſame regulations as in the courts at Weſtminſter. Expences of juries how to be paid. Perſons requeſting juries to enter into bond to proſecute. Notice of injury to be given to proprietors before complaint to the commiſſioners. Perſons giving falſe evidence to be deemed guilty of perjury. Manner of making ſatisfaction for damages done in getting materials. Verdicts for value of lands, and money for damages, to be aſcertained ſeparate upon payment

or

or tender of moneys. Proprietors to enter to make canal and collateral cut. Verdicts to be recorded, and land to be veſted in the company. Purchaſe moneys to be laid out to the ſame uſe. Commiſſioners to ſettle the proportions of the money to be paid to the ſeveral perſons intereſted. Clauſe for the recovery of purchaſe money for lands. The company not to enter upon land without conſent of occupiers, if the owner be out of the kingdom, or under any diſability to act. Perſons deſtroying the works ſhall be adjudged guilty of felony. Proprietors may raiſe one hundred and thirty thouſand pounds among themſelves. Application of that ſum. The money to be raiſed to be divided into thirteen hundred ſhares, at one hundred pounds each. Shares deemed perſonal eſtate. If one hundred and thirty thouſand pounds ſhould not be ſufficient, the company may borrow ſixty thouſand pounds, and aſſign the navigation, &c. as a ſecurity. Form of aſſignment. Aſſignments to be entered into a book, and may be transferred. Form of transfer. Transfers to be entered by the clerk. The intereſt of the money borrowed to be paid firſt. Three per cent. to be paid to the proprietors till the work is completed. Subſcribers to have a vote for every ſhare by themſelves or proxies. General aſſembly for chooſing committees. Committee ſubject to controul of general aſſembly. Books to be kept. General aſſemblies to conſiſt of five hundred ſhares. Power of general aſſemblies. Subſcriber forfeiting his ſhare to have perſonal notice, and the forfeiture muſt be declared at a general aſſembly. General aſſemblies may make bye laws. On the death of ſubſcribers before their ſhares ſhall have been completed, executors may do it. Shares may be diſpoſed of. After a call no ſhare to be diſpoſed of till the money paid. Form of the ſale. Officers to be appointed. The clerk's duty. Proceedings of commiſſioners to be entered in a book, and to be admitted as evidence. Rates allowed to be taken, viz. for tonnage and wharfage upon coal, between the Stroud canal and Sapperton tunnel, one ſhilling and three-pence per ton. Between the weſt end of Sapperton tunnel and Circenceſter, one ſhilling per ton. And between the Circenceſter branch at Siddington and Leachlade,

two

two ſhillings per ton. And for iron, ſalt-ores, ſalt-rock, lime-ſtone, chalk, crates of pottery, crates of black glaſs, timber, flint, bricks, ſtone, clay, copper, braſs, and tin, and tin-plates, lead, ſpelter, and pot-metal, window-glaſs, and plate-glaſs, two-pence per ton per mile; and three-pence per ton per mile upon all other goods and merchandiſes whatſoever; and ſo in proportion for any greater or leſſer quantity than a ton, or any greater or leſs diſtance than a mile. Rates how to be recovered. Further allowance for goods remaining upon the wharfs above twenty-four hours. Maſters of boats to give an account in writing to the collectors of the particulars of the goods, on penalty of ten ſhillings per ton. What quantity of timber ſhall be deemed a ton. In caſe of difference concerning the weight of goods, collectors may weigh them, &c. The proprietors are empowered to regulate and fix the prices of ſmall parcels under a hundred weight. The navigation to be free upon paying the tolls. Boats of leſs burthen than on the Thames and Severn. Boats not to paſs without leave. A clauſe allowing the owners of lands to uſe pleaſure-boats on the canal. From ſuch time as the new intended canal ſhall be completed from Wallbridge to the diſtance of one hundred and fifty yards above the high road, which croſſes the line of the ſaid new canal at Brinſcombe (at which ſpot there will be a bridge over the ſaid new canal), in manner ſufficient for the paſſage-boats, and for ſo long as the ſame canal ſhall be ſo continued, the proprietors of the Stroudwater navigation ſhall, in lieu of the preſent rates, demand the following: viz. for coals carried from the commencement of the navigation at the river Severn to the termination at Wallbridge, and paſſing from thence into the ſaid new canal, and going thereon any diſtance not exceeding one hundred and fifty yards above the aforeſaid road, two ſhillings and three-pence per ton; but for coal going more than one hundred and fifty yards above the ſaid road, and not afterwards returned back again below the ſaid boundary of one hundred and fifty yards from the ſaid road, one ſhilling per ton, in lieu of the ſaid two ſhillings and three-pence per ton. But if at any time ſuch coals or merchandiſe having paid the one ſhilling per ton only to the Stroud

canal

canal company, ſhall be landed at any place between Wallbridge and the diſtance of one hundred and fifty yards above the ſaid road at Brinſcombe, or ſhall be brought back again from above the ſaid boundary of one hundred and fifty yards from the ſaid road, then five ſhillings per ton ſhall be paid to the Stroud canal company, by the maſter of the boat; out of which ſuch coals or merchandiſe ſhall be ſo landed or returned.

For flints, bricks, ſtone, clay, chalk, ſalt-ores, ſalt-rock, and limeſtone paſſing from the ſaid Stroudwater navigation into the new canal, and going thereon more than one hundred and fifty yards above the ſaid road, and not returned afterwards back again below the ſaid boundary of one hundred and fifty yards from the ſaid road, or going out of the ſaid new canal into the Stroudwater navigation, and having previouſly at any time paſſed along any part of the ſaid new canal, above the ſaid boundary of one hundred and fifty yards from the ſaid road, one half-penny per ton per mile ſhall be paid. And for timber, black glaſs-bottles, and phials, and crates of pottery, one-penny per ton per mile. And for iron caſtings and wrought iron, and all other goods and merchandiſes whatſoever, one-penny half-penny per ton per mile; and ſo in proportion for any greater or leſs quantity than a ton, or any greater or leſs diſtance than a mile: but for any of ſuch enumerated articles, or of ſuch other goods or merchandiſe paſſing from the ſaid Stroudwater navigation into the ſaid new canal, and not going thereon further than one hundred and fifty yards above the ſaid road, or going out of the ſaid new canal into the ſaid Stroudwater navigation, and not having previouſly at any time paſſed along the ſaid new canal, above the ſaid boundary of one hundred and fifty yards from the ſaid road, two ſhillings and three-pence per ton ſhall be paid in lieu of ſuch ſeveral rates before mentioned. There ſhall be a free communication between the intended canal and the river Severn, on payment of the rates. Rates to be taken by the Thames and Severn company in conſequence of the above, viz. for coals carried upon the Stroudwater navigation,

vigation, from the commencement thereof at the river Severn to the termination at Wallbridge, and paſſing from thence into the new canal, and going thereon no further than one hundred and fifty yards above the ſaid road, one ſhilling and three-pence per ton; but for coals going more than one hundred and fifty yards above the ſaid road, and not afterwards returned back again below the ſaid boundary of one hundred and fifty yards from the ſaid road, then ſuch ſum as the proprietors of the Thames and Severn navigation ſhall think proper. And when the Thames and Severn company lower their rates, the Stroudwater company are to lower their rates. The powers of the Stroudwater company, within their own limits, are not altered, unleſs they reduce their rates taken at Wallbridge. Materials for making and repairing the reſpective canals to paſs free mutually. Perſons navigating the Thames and Severn canal not to land goods on Wallbridge wharf without leave, except materials, whilſt the navigation is making. Boatmen to ſhew their paſs-tickets. Drains to be made in the canal to convey the water from the lands adjoining, and how the ſame are to be maintained. Land-owners aggrieved by the obſtruction of the company's water-courſes, may cleanſe them at the company's expence. When cattle ſhall be deprived of watering places, others to be provided. Clauſe for fencing off the towing-paths, and making bridges. If the company do not fence off the towing-paths, and make bridges, &c. land-owners may do it at the company's expence. If bridges, &c. made by the company are inſufficient, land-owners may make others at their own expence. The company enabled to cleanſe the adjoining water-courſes at the land-owners expence, if they neglect. Land-owners may erect warehouſes, &c. on their own lands. Maſters to put their names on the outſides of the boats, and ſuffer them to be meaſured, on penalty of forty ſhillings. Boat-maſter or owner made accountable for damages done by the crew. Proper places to be made for boats to turn or lie in, for other boats to paſs by. Veſſels lying ſo as to obſtruct the navigation to be removed. Veſſels ſunk to be weighed up. Perſons overloading and obſtructing the paſſage of the canal, to forfeit five pounds. Perſons

throwing

throwing ballaſt into the canal to forfeit ten pounds. Perſons opening the locks, or doing other damage to the navigation, to forfeit a ſum not more than five pounds, nor leſs than twenty ſhillings, at the diſcretion of the juſtices. Regulations of veſſels paſſing through the locks. Veſſels paſſing locks with leſs than ſix tons to pay a lock due, and tonnage for ſix tons. Canal not to be under the power of commiſſioners of ſewers. Proprietors to be taxed for lands and buildings, in the ſame proportion as adjoining lands and buildings. Land-owners are allowed to carry manure toll free. Rights of lords of manors and land-owners to the fiſhery reſerved. Perſons on board having nets, &c. not being qualified, forfeit five pounds. Stones to be erected every half mile. Mode of electing new commiſſioners. Their qualification. Commiſſioners acting, not being qualified, to forfeit fifty pounds. Commiſſioners to give notice of their meetings. Commiſſioners to be ſworn. The oath. Commiſſioners may act as juſtices. No commiſſioner to act as ſuch while he poſſeſſes any place of profit. General meeting of commiſſioners. Meetings upon requeſt may be ſummoned at any time. No meetings to determine diſputes, &c. but within five miles of the canal. Writings to be exempted from ſtamp-duties. Security to be taken from the treaſurer, &c. Clauſe to compel payment of ſubſcriptions. Penalties and forfeitures how to be recovered and applied. Perſons aggrieved by any irregularity in diſtreſs to recover only the ſpecial damage. Perſons aggrieved may appeal to the quarter-ſeſſions.

I hope this long extract may not be thought ſuperfluous, as it could not eaſily be compriſed in a ſhorter compaſs.

Hiſtory informs us, that ſo long ago as the reign of Charles II. a project was ſet on foot for uniting the Thames with the Severn, by cutting a channel of above forty miles in length; and that a bill was brought for that purpoſe into the Houſe of Commons. Joſeph Moxon, who was hydrographer to the king, and an excellent mathematician, drew a map for Mr. Matthews, to ſhew that the ſcheme was practicable.

In Dr. Campbell's Political Survey of Great Britain he obſerves, that the correſpondence between London and Briſtol being very expenſive by land, and tedious by ſea, it was natural to endeavour at finding ſome means of leſſening at leaſt, if not removing, theſe inconveniences. In order to this it was propoſed to make uſe of the Avon, which runs to Briſtol, and the Kennet, which falls into the Thames; but it does not appear this ever went further than ſpeculation. In the reign of Charles II. a bill was brought into the Houſe of Commons, to unite, by a new cut from Leachlade, the Thames with the Avon, that paſſes through Bath. Captain Yarranton propoſed the ſame thing, by uniting the Thames by the Charwell, to the Avon by the Stour, and ſo to the Severn, with only eight miles of land-carriage. It ſeemed neceſſary to mention theſe, becauſe it may become requiſite to review and fix on ſome one of them at a future time, when, in conſequence of a method to be hereafter explained, a communication ſhall be accompliſhed between Hull, Liverpool, and Briſtol; for in that caſe ſome ſuch communication by water will be neceſſary to maintain that intercourſe between the midland counties and the capital, which is of ſo great conſequence to both.—So far Dr. Campbell. It is needleſs to obſerve, that what he ſuggeſted is now completed, but not by the courſe he has pointed out.

The idea of forming a communication between the Thames and Severn, by a canal, did not eſcape the imagination of the immortal Pope, who thus writes in a letter to a friend: "I could paſs whole days in de-
"ſcribing to her the future, and as yet viſionary, beauties that are to
"riſe in thoſe ſcenes (ſpeaking then of Lord Bathurſt's woods at Ciren-
"ceſter), the palace that is to be built, the pavilions that are to
"glitter, the colonnades that are to adorn them; nay more, the meet-
"ing of the Thames and Severn, which, when the noble owner has
"finer dreams than ordinary, are to be led into each other's embraces,
"through ſecret caverns of not above twelve or fifteen miles, till they
"riſe and celebrate their marriage in the midſt of an immenſe amphi-
"theatre,

" theatre, which is to be the admiration of poſterity a hundred years hence.
" But till the deſtined time ſhall arrive, that is to manifeſt theſe won-
" ders, Mrs. Digby (the lady of the honourable Robert Digby) muſt
" content herſelf with ſeeing what is at preſent no more than the fineſt
" wood in England."

The execution of this grand work, with others equally wonderful and uſeful in different parts of this kingdom, was reſerved for the reign of George III. I have before mentioned the canal cut from Stroud to the Severn, near Fremiload, after many unſucceſsful attempts to make the river Stroudwater navigable. Mr. Robert Whitworth, that able and ſucceſsful engineer in works of this kind, was employed in 1782, at the deſire of ſeveral opulent private perſons, chiefly merchants of London (not the corporation), who had no local intereſt in either of the counties of Wilts or Glouceſter, through which the canal paſſes. The act paſſed in the year 1783; an extract of which I have juſt given, and was agreeable to the plan and eſtimate of their engineer, who had ſtated the ſum requiſite to complete the undertaking at one hundred and thirty thouſand pounds, and was empowered to borrow a further ſum of ſixty thouſand pounds more if wanting, to finiſh the ſaid canal on mortgage, under their common ſeal.

This navigable canal begins at Wallbridge, near Stroud (at the very place where the Stroud navigation ends), and proceeds to very near Leachlade, on the river Thames, being a diſtance of thirty miles ſeven chains and a half, exact meaſurement. The general breadth of the canal is forty-two feet at top, and thirty feet at the bottom. In many places, where the ground is a dead level, it is conſiderably wider; the banks and towing-paths being made entirely with the ſoil dug from the canal. The tunnel at Sapperton is nearly two miles and a half in length, being lined with maſonry, and arched over at top, with an inverted arch at the bottom, except at ſome few places, where the ſolid rock being ſcooped out renders it unneceſſary. The boats are twelve

feet wide, and eighty feet long, and when loaded draw four feet water, and will carry ſeventy tons. This whole canal was executed in the moſt maſterly and complete manner within the time propoſed, which was ſeven years.

In order to form any proper judgment of the importance to commerce of this undertaking, it will be neceſſary to take a large and comprehenſive view of the intercourſe between the ports of Wales, Briſtol, Glouceſter, Worceſter, and even Shrewſbury; and alſo of the numerous inland navigations connected with the Staffordſhire and Worceſterſhire canal; and of the intermediate courſes of the river Thames, from Leachlade, by Oxford, Wallingford, and Reading, to London. The various articles of produce and manufactures in ſuch a ſcope of country, which comprehends the whole internal trade of the kingdom, are more perhaps than I can immediately enumerate, and indeed ſuch an enumeration is almoſt needleſs, as I have before given, when ſpeaking of the courſe of the canals, a particular account of the natural produce, manufactures, and commerce, not only of thoſe counties, but even of the towns and villages through and near which they paſs.

The advantages to the inhabitants living on the banks of the canals, and alſo on the banks of the rivers into which canals are cut, are almoſt inconceivable. The artiſt, the trader, the manufacturer, are all enticed as it were to induſtry, as new veins of trade are opened to their view, and by the conſtant, eaſy, cheap, and certain carriage of their goods to a market, while raw materials for working are brought back to their doors by the ſame conveyance. The connection of the river Thames with the Severn, by the means of this canal, and alſo with the internal parts of the kingdom, by the Oxford and Coventry canals, which lead to Birmingham, and alſo the counties of Stafford, York, Cheſhire, and even to Weſtmorland, forms a line of communication with the capital, of the greateſt importance, and which cannot but excite a prodigious ſpirit of enterpriſe among the citizens and traders.

On the 20th of April 1789, Mr. Clowes, the acting engineer, left to conduct the buſineſs under Mr. Whitworth (who was then alſo employed in the Firth and Clyde canal navigation in Scotland), paſſed through the tunnel for the firſt time at Sapperton, in a veſſel of thirty tons burthen; and the junction was completed, and a veſſel paſſed from the Severn into the Thames for the firſt time on the 19th of November in the ſame year, in the preſence of a multitude of people, who came from all parts of the country, within ten or twelve miles, on the occaſion.

On the 19th of July 1778, when their majeſties were at Cheltenham, they expreſſed a deſire to view the tunnel at Sapperton, in the praiſe of which fame had been ſo laviſh. Accordingly that day was appointed, and his majeſty viſited the entrance with aſtoniſhment and delight, and beſtowed the higheſt praiſe on a work of ſuch magnitude, expence, and general utility, and expreſſed ſtill greater ſatisfaction when he was informed, that it had been conducted and completed by private gentlemen.

The length of the canal, I have before obſerved, is thirty miles ſeven chains and a half, of which from Stroud to Sapperton is ſeven miles three furlongs,with a riſe of two hundred and forty-one feet three inches; from Sapperton tunnel to Upper Siddington, and the branch to Cirenceſter, nine miles and eight chains and a half, and is level; from Upper Siddington to Leachlade is thirteen miles four furlongs and nine chains, and with a fall of one hundred and thirty feet ſix inches.

A very intelligent author ſays, that ſo unfavourable was nature to the deſign of joining the river Thames to the Severn, that a ſubterraneous cut ſixteen feet ſquare muſt be made through two miles of ſolid rock at the expence of eight guineas per yard. The place he alludes to is Sapperton tunnel.

CHAP.

CHAP. XI.

Account of a Propoſal for opening a Canal Navigation from the River Thames to the Severn.—Project to ſhorten the Thames Navigation, by a Cut or Canal from Monkey Iſland, near Maidenhead, to Reading.—The Scheme at preſent rendered abortive.—Account of the intended Canal from Reading to Iſleworth.—Its Utility.—Section of the River from Mortlake to Boulter's Lock.—Account of the Canal projected from London to Waltham Abbey, into the River Lea.—Canal from Limehouſe into the River Lea.—Leeds and Selby Canal.—Account of the Huddersfield Canal.—Leeds and Liverpool Canal.—Kendal Canal to Liverpool.—Plan for an Inland Navigation from Kendal to London, above Five Hundred Miles in Length, and other Navigations which might be carried into Execution to great Advantage.—Baſingſtoke Canal.—Andover Canal to Redbridge, near Southampton.—Winſton Canal, in the Biſhoprick of Durham, by Darlington, to Stockton, on the River Tees.—Cheſter Canal to Middlewich, with the Branch to Nantwich.—Birmingham Canals.—Langley Bridge Canal.—Cheſterfield Canal.—Propoſed Canal from Bude to Launceſton in Cornwall.—Canal from Market Weighton to the Humber, and for draining Twenty Thouſand Acres of Land.—Canal cut by Sir Nigel Greſley, to ſupply the Town of Newcaſtle under Line with Coals, from his Eſtate at Apeſdale, in the County of Stafford.—Canal cut by the Earl of Thanet, from his Eſtate called The Spring, near Skipton Caſtle, in the County of York, to join the navigable Canal from Leeds to Liverpool, to ſupply the Neighbourhood with Lime and Limeſtone.—Account of the Canal cutting from Cardiff, in the County of Glamorgan, in South Wales, to a Place called Merthyr Tidwell, in the ſame County.—Projected Canal from Neath, in the ſame County, to Furno Vaughan.—Account of Two Canals alreaay cut through private Property for the public Good; one of them from near Swanzey to Neath, through a Moraſs; the other from Kidwelly in Carmarthenſhire, to the Coal-mines of Mr. Keymer.

INTENDED

INTENDED CANAL FROM MONKEY ISLAND TO READING.

IN 1754 a propoſal was made for opening a navigation between London and Briſtol, by the way of Hungerford, Marlborough, Coln, Chippenham, and another by the way of Oxford, Leachlade, Cricklade, Malmſbury, and Chippenham. It was projected to join the Severn, Trent, and Humber, by the means of the two rivulets Penk and Stour, which would give the advantage of water-carriage to ſeventy-one cities and market-towns.

A canal fifty feet wide at top, thirty at bottom, and four feet deep, might be made at the rate of three hundred pounds per mile, by employing the ſoldiery in the work, with an additional eight-pence a day, and allowing ſeven hundred pounds a mile for the purchaſe of grounds, building locks and bridges, and making reſervoirs. The amount of the whole expence would be about one thouſand pounds a mile; and conſequently three hundred thouſand pounds would complete a navigable canal three hundred miles in length, which is more than neceſſary for the purpoſes required.

The propoſer of the above confeſſes himſelf no engineer (which is very obvious); but ſays he was led into that train of reflection by a journey he made in the year before (in 1753) through Flanders, where he ſaw ſeven thouſand Auſtrian ſoldiers at work on the canals between Ghent and Oſtend, to make a watery highway (as he terms it). The expence of this, and the erection of locks at Sas-van-Ghent, could not amount to leſs than two hundred thouſand pounds, which was to be raiſed by a land-tax laid on by an aſſembly of the eſtates of Brabant, at Bruſſels. This vaſt expence was voluntarily incurred only to make a commercial highway for about forty miles in length. Of ſuch importance

portance to commerce do that prudent and wiſe people conſider an eaſy communication between city and city to be. So far my author.

The advantages ariſing from canal navigations to manufactures, commerce, and agriculture, above thoſe of navigable rivers, are univerſally acknowledged. There have been many courſes for navigable canals pointed out in this kingdom, that are practicable and eligible; ſome of which have already been carried into execution with honour and profit to the proprietors, and credit to the engineers and conductors, as has already been ſhewn; but there are none from which greater benefits and advantages would ariſe to the public, and to the counties through which they paſs, than a cut from Monkey Iſland, in the river Thames, near Maidenhead to Reading, in the county of Berks (though this is in fact only part of a larger deſign, which I ſhall hereafter mention); for by means of ſuch a canal the price of proviſions would be greatly leſſened in London, and the country ſupplied with coals at a much cheaper rate. By this canal alſo, in order to ſhew the particular length of the intended navigation, the diſtance is only fifteen miles and a quarter, and by another route only fourteen miles and three quarters, but by the river it is above twice that diſtance.

The expence of taking a barge of one hundred and twenty tons burthen from Monkey Iſland to Reading, has been proved, before a committee of the Houſe of Commons, to be fifty pounds, and the paſſage cannot be performed in leſs than three days, and often three weeks, and it has even been known to have been two months; whereas, by a canal, it may be performed, at all ſeaſons of the year, excepting a very hard froſt, in ſix hours, and at the expence of only four pounds ſeven ſhillings; ſuppoſing the tonnage to be laid at a halfpenny per ton per mile, as is propoſed.

By the river, the diſtance can never be ſhortened, nor can the labour of paſſing againſt the ſtream ever be avoided. It is confeſſed likewiſe, that

that no method can be diſcovered to make the river navigations paſſable in time of floods, which in moſt years continue for ſeveral months during the winter.

As no private property will be allowed in the canal (the money being intended to be raiſed by annuities), it is preſumed the propoſers will have every inducement to make ample ſatisfaction for injuries to individuals, nor is it poſſible they can have any motive to the contrary.

No private perſon can receive any benefit that is not common to the public; therefore the public only are intereſted in this uſeful deſign, as this canal is intended to be a free navigation after the tolls have paid off the expences of making it, and a ſufficient fund has been accumulated to keep it in repair, which it is apprehended, from a moderate computation, will be in leſs than forty years.

Notwithſtanding theſe arguments are not to be confuted, yet ſome indiviuals, pretending their private property would be injured, the country drowned, and raiſing many other ſuch weak and abſurd objections, which could only be ſtarted by men of contracted and ſelf-intereſted views, have found means (in a great aſſembly) to have this uſeful ſcheme rejected. But it cannot die; for its merits moſt certainly one day or other will revive it. I hope my readers will not be offended at my informing them of what may be done, as well as what has been done, with reſpect to the river Thames; for although ſome of theſe plans have not yet been executed, yet when the different canals in the interior parts of the country are completed, which are drawing faſt to a concluſion, and the benefits and advantages derived from a communication between thoſe great ſea-ports Briſtol, Liverpool, and Hull, which are now happily united by an inland navigation, ſhall have become generally known, it is very improbable that the city of London, the firſt

in the world for commerce, will tamely lie idle, and not take advantage of the opportunity to come in for her ſhare. Indeed it is an unpardonable fault ſomewhere, that London did not take the lead, and ſet the example in a work of ſuch great national importance, and not ſuffer a few intereſted individuals to oppoſe a ſcheme of ſuch magnitude, but make a vigorous application to parliament, which no doubt will view the advantages of the plan in their proper light, and not ſuffer the public good to be obſtructed by private individuals, but rather take example by the wiſe regulations of the empire of China, where not even the emperor's gardens or pleaſure-grounds are ſacred from a public canal.

INTENDED CANAL FROM READING TO ISLEWORTH.

AFTER the above particulars, it may not be improper to proceed to acquaint thoſe who would wiſh to be informed of what is propoſed to be done by the city of London, and county of Berks, towards making a navigable canal from Iſleworth, in the county of Middleſex, to the town of Reading, in the county of Berks, and repairing the channels of the old river.

At a general meeting holden at the Town-hall at Reading, on Tueſday the 9th day of October 1770, it was agreed, that a canal ſhould be cut from Sunning to Monkey Iſland, and that no perſon whatever ſhould be injured thereby. It was alſo agreed, that the river Thames from Sunning to Boulter's Lock ſhould be amended at the expence of the canal, without any other toll being taken upon the river than what is now taken.

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At the ſame time it was agreed, that the money ſhould be raiſed by life annuities, and when the tolls collected ſhould have paid the expences of cutting the canal and repairing the river, and when a ſufficient ſum ſhould be accumulated for the perpetual repair thereof, that then the navigation for ever after ſhould remain and be a free navigation.

And at another meeting held on the 7th of November 1771, at Reading, it was further agreed, that the ſaid canal be of ſuch dimenſions as to admit of the largeſt barges now navigating the river Thames to Reading, to paſs and repaſs freely in every part.

When the deſign of this canal was firſt laid before the city of London, a committee was appointed to enquire into the utility of ſuch a meaſure, and every proper ſtep has been ſince taken to extend it. Plans have been made, and eſtimates prepared, both for making a canal from Iſleworth to Monkey Iſland, and alſo for repairing the river from Monkey Iſland to Mortlake, in the county of Surrey; ſo that the application of the commiſſioners for repairing the river by an additional duty upon coals, ſeems to be precluded, becauſe the river will be repaired without any expence to them, and without any additional toll upon the river; the conſequences of which will be, that all the trade upwards will paſs upon the canal, becauſe that being ſtill water, and the diſtance ſhortened, the expence and labour will be greatly reduced, and moſt of the trade downwards (except in the time of floods) will be by the river, becauſe the barges and boats will be able to fall down the ſtream without labour, and ſave the expence of returning by the canal. In conſequence of the increaſe of navigation, the river will have a much greater trade downwards than ever it had before, and the canal will be leſs obſtructed by veſſels returning to London; and it being intended to be of ſuch dimenſions as to receive the largeſt barges navigating the river Thames weſtward, it is ſuppoſed it will not be poſſible for any perſon whatever to be injured by it. For by Mr. Brindley's firſt re-

port it appears, that the expence of taking up a barge of a certain ſize from Iſleworth to Sunning, and back again by the river, is eighty pounds, which by the canal may be done for ſixteen pounds; ſo that there will be a ſaving in expence of ſixty-four pounds out of eighty pounds, without noticing the difference in time, or damage of goods, loſs by pilferings, and diſappointments by long droughts in ſummer, and floods in winter, incidental to the river navigation.

From what has been ſaid, it will appear that the moſt expeditious paſſage for all veſſels going upwards to Henley and Marlow, will be to paſs the canal to Sunning (which may be done in one day with the largeſt barges), and fall down the river to Henley and Marlow, without labour of the ſtream. A lock being placed below Monkey Iſland, for the better croſſing the canal, will make level water, and an eaſy paſſage up to Maidenhead and Boulter's Lock.

A branch of the canal is propoſed to fall into the river about Windſor-bridge, for all veſſels going from London to Windſor, Datchet, Old Windſor, &c.; and a branch alſo is to be cut from Weſt Belfont to Staines, Laleham, Chertſey, Weybridge, the Guildford navigation, Sheperton, Sunbury, &c.

And for the more eaſy paſſage from London to Brentford, Iſleworth, Richmond, Twickenham, and Kingſton, a good towing-bank will be brought down as far as Mortlake; and a dam will be made with ciſtern-locks, to keep the banks always full to high-water mark, which will preſerve level water up to Tedington. By this means moſt veſſels will be able to reach Mortlake in one tide from London, and will then be ſure of an eaſy paſſage and level water into the canal: an improvement which will make the whole country above it the moſt delightful ſpot in Europe.

Any perſon, by inſpection of the map and courſe of the river Thames,

Thames, will diſcover at firſt ſight the great utility of this undertaking; for by carrying the eye in a ſtraight line from Maidenhead to Iſleworth, it will be perceived that the navigation will be ſhortened two parts in three.

To give the profile or ſection of the river from Mortlake to Boulter's Lock, near Maidenhead, with all the deeps and ſhallows, would be too tedious, and of little utility here. But the different falls or deſcents of its ſurface at Boulter's Lock may be worthy notice. The water above the lock appears to be above five feet deep; but below, the vaſt force of the water coming down from ſuch an unmechanical lock, has worked or dug a hole of twenty feet perpendicular depth, and above one hundred feet in length; beyond which riſes a hill thrown up by the great force of the current, where the bed of the river has little more than three feet depth of water.

The whole fall from Boulter's Lock to Mortlake is ſeventy-five feet ſeven inches, and the diſtance is forty-one miles one furlong. This ſurvey and meaſurement was taken for and by the order of the city of London, in the moſt accurate manner, to ſhew the impoſſibility of making a good navigation in the bed of the river, or any other where the fall is ſo great, as has been proved by ſad experience in many inſtances. It may not perhaps be amiſs to mention a few among ſeveral.

The river Avon, from Saliſbury to Chriſtchurch, was made navigable, and was opened but a very ſhort time before it was entirely deſtroyed by the floods, and it has not yet been thought worth while to repair it. There is ſome intention, as I am informed, to make a canal parallel with it. The river Stour, from Stourbridge to the Severn, has undergone the ſame fate. The navigation of the rivers Merſey and Irwell have had moſt of their works deſtroyed by the rapidity of the floods. And the navigation of the river Calder in Yorkſhire, about the year 1774, was very greatly damaged, and rendered impaſ-

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ſable for above twelve months, and then repaired at a very great expence; but it ſtill remains expoſed to the ſame danger.

INTENDED CANAL FROM LONDON TO WALTHAM ABBEY.

BEFORE I quit the ſubject of the metropolis, I will give ſome ſhort account of an intended navigable canal from Waltham Abbey, in the county of Eſſex, into a large baſin, to be cut in Moorfields, London—a moſt noble improvement, projected and promoted by Mr. James Sharp, for the advantage and ornament of the city of London.

Mr. Sharp, having conceived the idea of a grand canal of communication between London and the adjacent country, made choice of the area of Moorfields, as the extreme point to which it might be moſt commodiouſly directed. With this view, about the year 1772, he cauſed the level to be taken from the quarters of Moorfields, in order to try where it would run into the river Lee, when, to his great ſurpriſe, he found it extend no leſs than thirteen miles and a half, and to approach ſo near to Waltham Abbey, as to make that place the other extreme point from whence it might proceed. In the courſe of this ſurvey it was obſerved, that ſuch a canal would in its progreſs paſs through a pleaſant part of the country, through every capital village in the courſe of its direction, and through incloſures, exhibiting the richeſt and moſt delightful rural proſpects that can be conceived.

The gentleman Mr. Sharp employed in taking this ſurvey, was the ingenious Mr. Robert Whitworth, who was draughtſman to the late celebrated Mr. Brindley, and aſſiſted in projecting moſt of his magnificent works.

This gentleman, upon trial, found the project of Mr. Sharp not only practicable, but much more eaſy to be carried into execution than in

moſt countries through which navigable canals have been made; and according to his calculation a canal ſixty feet wide at the ſurface, four feet and a half deep, and terminating in a baſin four hundred feet long, and two hundred feet broad, in Moorfields, might have been completed from Waltham Abbey, for the ſum of fifty-two thouſand four hundred and ninety-five pounds, a ſum inconſiderable in compariſon to the advantages that would accrue from it to the city of London, but more particularly to the country through which it was intended to paſs, every foot of which adjoining to its banks would be increaſed in value in proportion to its ſoil and ſituation.

Upon this repreſentation of the facility of carrying this deſign into execution, Mr. Sharp thought proper to proceed, and cauſed a plan to be prepared and laid before the court of common council, in order to take the ſenſe of that reſpectable body in a matter that ſo highly concerned the intereſts of the city. It was ſome time before the plan could be completed; but it was no ſooner ſeen than approved, and a petition was preſented to parliament, for leave to bring in a bill to enable the city to carry it into execution.

Previous to this preſentation Mr. Whitworth was deſired to conſider of the manner of conducting the canal, and of the application of it to the moſt beneficial purpoſes, as well with reſpect to health and ornament, as for general utility.

He was given to underſtand, that the quarters of Moorfields were ſet apart as a pleaſure-ground for the citizens of London to walk in for the benefit of the air: he therefore very judiciouſly contrived, not only to ſecure to them that privilege, but to heighten the pleaſure of the enjoyment, he propoſed to ſurround the baſin with a ſpacious gravel walk, by which any number of perſons might amuſe themſelves by the ſides of a clear ſtream, which no doubt would have been filled with

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veſſels of various conſtruction, as none were to be admitted but boats for pleaſure, except only thoſe for carrying light goods and paſſengers to and from the country. For beſides the ſmaller baſin in Moorfields, which Mr. Whitworth had appropriated chiefly to pleaſure, he had projected one of a more ample conſtruction, of a circular form five hundred feet in diameter, to be laid out between the field near Holywell Mount and the tabernacle, with wharfs extending eighty feet every way from the water's edge, ſkirted round with buildings for mercantile purpoſes, which would have amazingly increaſed the trade of the city, and have produced many great and extenſive advantages, ſome of which Mr. Sharp has enumerated, and which are as follows.

Health he conſiders as the firſt and greateſt advantage; and that he thinks will be promoted in an eminent degree by a conſtant circulation of free air, occaſioned by the paſſing and repaſſing of veſſels for pleaſure and buſineſs upon a clear ſtream, and by facilitating the communication with the country.

Next to health he ranks the advantage of ſupplying the city more copiouſly with proviſions, the moſt likely means to reduce the price. Milk in particular, which is now of a very bad quality, owing to the rank food of the cows in the ſuburbs, would then have been brought twice a day, by water, from cows fed in meadow-lands with wholeſome graſs, inſtead of grains and cabbage-leaves.]

Butcher's meat, in like manner, would have been brought from places remote from town, where cattle would have been ſlaughtered without being heated with over-driving, and conſequently have been fitter to be preſerved in ſalt.

Corn, malt, and flour, at a ſmall expence, would have been ſpeedily brought from Ware, Hertford, Biſhops-Stortford, and other towns and villages at a greater diſtance, without being loaded with the expence of

double

double carriage; and coals, and other heavy articles, would have been returned nearly as cheap as the ſame are ſold in London.

Hay, ſtraw, coals, brick, ſtone, chalk, lime, but more particularly timber, would have been capital articles of traffic on this canal.

The number of horſes would be diminiſhed, in proportion as the quantity of thoſe heavy goods brought by water ſhould be increaſed; ſo that the ſaving of provender would be no inconſiderable object.

The conveyance of paſſengers by water, in veſſels elegantly finiſhed and decorated, from one end of the canal to the other, at the ſmall fare of three-pence, would not only have been of great convenience to paſſengers in general, but more particularly to thoſe who might be inclined to collect and bring to market the ſmall articles of poultry, butter, eggs, &c. A large reſervoir of water would always have been ready for extinguiſhing fires in every part in the city. By means of channels of communication, the filth of the city might all have been carried off from the common ſhores, at times when the abundance of rain might make water plenty. Theſe, and many other advantages, would have accrued to the city of London from the completion of this plan.

To the proprietors of land, and to the inhabitants at a diſtance, the advantages would have been proportionably great. Fields would have been converted into gardens, and waſtes into fertile fields, by means of the plentiful ſupply of manure, and the penury of the poor country labourer relieved by the profuſion of the citizen.

This project, however, being oppoſed by certain individuals in the Houſe of Commons, who conceived it to be contrary to their intereſt, was rejected, and, conſequently, never carried into execution.

LEEDS TO SELBY CANAL.

An Account of a navigable Canal from Leeds to Selby in Yorkſhire.

THE firſt and moſt obvious advantage of a canal is, that its navigation is equal and regular; for it is not ſo certain that a waggoner will come to an hour at his inn, as that a boat floating on a canal will arrive at a ſtated time at its point of deſtination. The time will always be certain, and, if the canal be properly formed, will always be leſs than that required to navigate a river. The ſaving in point of time will be of the utmoſt importance to trade; and as the buſineſs which requires ten days in performing upon the river Air, will more frequently be done upon the canal in as many hours, if the difference in freight bear any ſort of proportion to the difference in the time, the ſaving in that article alſo will be inconceivably great.

An artificial cut will be drawn with fewer curves, and will have no ſtream either way to oppoſe the veſſels. By ſhortening the carriage, a valuable improvement will be made; and ſuch is the improvement which the canal now projected will produce, by which, though it is only twenty-three miles in length, the paſſage from Leeds to Hull will become ſix miles ſhorter, and the paſſage from Leeds to Selby, Tadcaſter, York, &c. thirty miles ſhorter than it now is.

In the reign of King William, when trade in this part of the country was far below its preſent ſtate, it was thought proper to facilitate communication by water-carriage; and an act of parliament was paſſed, by which certain lock-dues, or rates of tonnage, upon the rivers Air and Calder, were granted for the encouragement of thoſe who had undertaken to make and keep them navigable, amounting to no leſs than ſixteen ſhillings per ton from the firſt of October to the firſt of May, and ten ſhillings per ton from the firſt of May to the firſt of October; rates

which,

which, if they were now to be exacted, would, even without the addition of freight, often exceed the price of land-carriage, and in many cases exceed the original value of the goods transported, and in a great measure put an entire stagnation to trade itself: yet these rates are now legal, and every abatement must be considered as a favour.

As the goods conveyed along the intended canal will have less length of passage, they may evidently be carried at a cheaper rate; and as water-carriage is preferred to land-carriage merely for its cheapness, the same reason makes one mode of water-carriage preferable to the other.

To mention the increase of trade in general terms, is to convey no distinct or accurate idea; it is necessary therefore to state particularly, that, by the yearly accounts of the number of woollen cloths made in the West Riding of the county of York, and given in to the justices of the Easter session 1772, it appears there were made, the preceding year, 112,370 pieces of broad cloth, measuring 3,223,913¼ yards, and 95,539 pieces of narrow cloth, measuring 2,377,517½ yards, amounting in value, reckoning the broads at five shillings a yard, and the narrows at four shillings a yard, to the sum of 1,281,481 pounds 13 shillings; besides which it is apprehended the stuff-trade carried on in Yorkshire, and the cloth and woollen trade carried on in Lancashire, of which no certain account can be obtained, are of much greater value than the cloth made in the West Riding.

Cloth, or the materials for cloth, are not the only things in such a country that require easy and expeditious transportation. Timber, stone, coals, lime, and provisions, whatever is necessary to the support or accommodation of great numbers of wealthy and diligent inhabitants, whom successful trade always brings together, and whatever is supplied by an extensive country, very various in its products, which may be useful to other parts of the kingdom, are always passing and repassing in this populous and busy province, in which a capital of many millions is

conſtantly employed: and that all thoſe would paſs and repaſs with more certainty, and at a leſs price, by the canal now propoſed, than by that now in uſe, is ſelf-evident; notwithſtanding which, the oppoſition it has met with from thoſe intereſted in the Air and Calder navigations has defeated the project, and rendered a laudable attempt to ſerve the public, after a very conſiderable expence, of no effect.

The propoſed route of this canal at once proves its utility. It was intended that it ſhould communicate in the townſhip of Holbeck with the canal now making from Leeds to Liverpool, paſs from Holbeck by Leeds to Hunſlet, and by Thwait Mill, thence croſs the river Air near the fire-engines, not far from Newton, and proceed by Fairburn, with a tunnel through the hill near Burton Salmon, by Hilham and Hambleton, near Thorp-hall and Thorp-dam to Selby, into the river Ouſe, which immediately falls down to Hull.

HUDDERSFIELD CANAL.

BEFORE I begin to deſcribe the Leeds canal, it will be proper to take notice of a canal intended to go from Huddersfield in Yorkſhire, to Cooper's Bridge over the river Calder, where the roads go off to Leeds and Wakefield.

This canal is to begin at King's Mill near the town of Huddersfield, and paſs Bau's Lane and Townſwell's Spring, croſſing the high road to Hallifax, and Houghditch and Black-houſe Brook near Deighton, upon the edge of Ladgrave Wood, to Cooper's Bridge. The length is near eight miles, and the fall is fifty-ſix feet ten inches, by nine locks, equally divided for the fall. This canal was firſt ſurveyed in 1766, and again in 1773, by Mr. Luke Holt; and in 1774 an act paſſed to enable Sir John Ramſden, baronet, (who is the ſole proprietor of the town of Huddersfield), to complete it. By its junction with the river Calder

Calder at Cooper's Bridge, it will open a communication with the great trading towns of Hallifax, Wakefield, Leeds, York, and Hull. Stones, ſlates, flags, lime, lime-ſtone, or coals, carried on this canal, to pay eight-pence per ton, merchandiſe one ſhilling and ſix-pence per ton, and toll to be taken for dung or manure.

And ſhould the canal from Leeds to Selby be completed, which there is every reaſon to believe it will, the county of York will then excel every county in the kingdom in the eaſy and expeditious manner of tranſporting goods from one town to another.

LEEDS AND LIVERPOOL CANAL.

A particular Account and Deſcription of the Canal from Leeds in York-ſhire to Liverpool in Lancaſhire.

A navigation between the eaſt and weſt ſeas, by the rivers Air and Ribble, was for many years deemed a practicable and deſirable work by ſeveral gentlemen of ſpeculation and public ſpirit; and ſome endeavours were uſed by them, at ſeveral periods, though without effect, to draw the public attention towards it. While this great deſign was in contemplation, his Grace the Duke of Bridgewater formed his plan of a navigable canal from Worſley Mill to Mancheſter; which he ſoon after executed with amazing ability and ſucceſs. Works of genius generally draw the attention of men of genius: Mr. Longbotham, therefore, having viewed and examined this canal, and the manner of carrying it into execution, and being animated with a juſt ſpirit of emulation, in the year 1767 conceived the noble deſign of making a ſimilar canal from Leeds to Liverpool; and to be thoroughly ſatisfied whether it was practicable or not, he took an actual ſurvey of all the intermediate country between thoſe two extremities, and produced a plan, with an eſtimate of the expence of executing it, at ſeveral public meetings, which were called at ſundry times and places in the counties of York and Lancaſter.

caſter. At ſeveral of theſe meetings, compoſed of the gentlemen and land-owners lying near the canal, it was unanimouſly reſolved, that the ſcheme was practicable, and, if executed, would be of great ſervice to the country: and to put the queſtion beyond a doubt whether it was practicable or not, it was farther agreed to call in Mr. Brindley to take a ſurvey; a gentleman whoſe ſurpriſing ſucceſs in executing works of this kind, has juſtly entitled him to the higheſt credit.

Mr. Brindley, after ſurveying by himſelf and his agent the whole courſe as laid down by Mr. Longbotham, reported to two numerous meetings of gentlemen, merchants, and manufacturers, held at Bradford the 5th, and at Liverpool the 9th of December 1768, that it was very practicable, and might be executed at an expence which he produced in a particular detail of all the works, and eſtimates of them, which is too long to particulariſe here, but of which the following is a ſummary account:

	£.
Mr. Brindley eſtimates the whole expence of making the propoſed canal from Leeds to Liverpool, being one hundred and eight miles and three quarters, upon a plan of forty-two feet wide at top, and five feet deep, at —— ——	259,777
The intereſt of which, at 5 per cent per annum, will amount to near —— —— —— ——	13,000
The expences of keeping it in repair, the ſalaries of officers, loſſes, and other accidents, he eſtimates at ——	4,000
Making together, per annum, —— ——	£. 17,000

And that the tonnage will at leaſt make as follows:

Lime-ſtone, lime, ſlate, flags, bricks, and free-ſtone, at a halfpenny per ton per mile —— —— ——	8,500

Coals

	£.
Brought forward	8,500
Coals at one penny per ton per mile —— ——	3,500
Lead, iron, deals, timber, hemp, flax, Hamburg yarn, woollen, linen, and cutlery goods of all kinds, groceries, dying wares, mahogany, ſalt, Burſlem wares, wine, ſpirituous liquors, corn, butter, cheeſe, Iriſh yarn, alum, &c. &c. &c. at one halfpenny per ton per mile —— ——	8,000
Total	£. 20,000

Theſe are the calculations on which this undertaking is founded; it is now to be conſidered, whether the advantages which may probably ariſe from this canal will equal the expence of making it.

The advantages which may probably ariſe from this canal, may be reduced to theſe two heads:

Firſt, Thoſe which will accrue to the particular county through which the canal paſſes.

Secondly, Thoſe which will accrue to the whole kingdom in general.

And firſt, the advantages which will accrue to the particular country are:

1. It will make the mutual exchange of the native productions and commodities of one part of that country for thoſe of another, eaſy, expeditious, and cheap.

2. It will greatly promote and increaſe the trades and manufactures carried on in it.

3. It will improve the lands, and increaſe population.

4. It will ſave an enormous expence of land-carriage.

Whoever takes only a ſuperficial view of the intermediate country between Leeds and Liverpool, will find that ſome parts of it abound with the beſt coal, but are deſtitute of lime-ſtone, while in other parts he will find inexhauſtible rocks of the beſt lime-ſtone, but a total want of coals. In others he will find fine ſlate, flags, and fire-ſtone lying neglected, and of no kind of value, on account of the prodigious expence of land-carriage, although they are much wanted along the whole courſe of the canal. In ſome parts there is great plenty of timber fit for ſhip-building, and great quantities of wood proper for common buildings, and making tools and utenſils in huſbandry, as well as for making charcoal and other purpoſes; while in others ſcarcely a ſingle tree, unleſs planted for ornament, is to be ſeen for many ſucceſſive miles.

In a great part of Craven and Lancaſhire, the whole country, for many miles together, conſiſts almoſt ſolely of paſture, and a very ſmall portion of meadow-land, and is employed in raiſing and feeding cattle only; inſomuch that the landlords generally reſtrain their tenants and ſervants from uſing the plough. Their corn for bread, and every other uſe, they are forced to get at a very great expence by land-carriage.

From this curſory and imperfect ſketch of the country it is viſible, at the firſt glance, what general and extenſive advantages will accrue to the whole adjoining country from this canal; which will, as it were, connect the whole, and make every part partake, at an eaſy expence, of the natural and acquired advantages and conveniences of the reſt.

Coals will be carried to burn the lime-ſtone throughout Craven; and the lime-ſtone will alſo be carried from thence, and coal brought from the coal-works adjoining to the canal.

The

The ſlate, flags, and free-ſtone that now lie buried and uſeleſs, will be brought to light, and not only ſupply thoſe parts of the country where they are wanted, but alſo be carried coaſtwiſe upon both the eaſt and weſt ſeas, even as far as London, as they are now brought from the neighbourhood of Leeds and Halifax by water carriage.

Timber for ſhip-building, and wood for building houſes, and for the various uſes to which it may be applied in huſbandry, and in ſeveral branches of manufactures produced by thoſe parts where it abounds, would eaſily and plentifully ſupply the wants of other parts where at preſent it is ſcarce and dear; and Craven, and the adjacent parts, where little or almoſt no corn is grown, but where very great quantities are and muſt be conſumed, will be eaſed of the exceſſive burden of land carriage, and will be conſtantly, plentifully, and eaſily ſupplied with that abſolutely neceſſary commodity, by this water carriage, from the market at Leeds on the one hand, and from what is called the file country in Lancaſhire on the other.

Theſe are a part, and but a very ſmall part, of the very great and almoſt inconceivable benefits which will ariſe to the whole intermediate country, by the mutual exchanges of the native productions and commodities of one part for thoſe of another.

2. It will contribute very much to promote and increaſe trade and manufactures.

We know from conſtant experience, that nothing contributes more to the encouragement of trade and manufactures, than the facility of conducting them, procuring the proper materials for them, carrying the goods manufactured to a market, and obtaining a certain and uniform ſubſiſtence for the manufacturers.

Now all theſe advantages will be derived from this canal. A conſtant, ready, cheap, and certain conveyance of every ſpecies of goods from one place to another, will render the management of trade eaſy, and will alſo ſupply the manufacturers with variety of materials; as Iriſh wool and yarn, cotton, indigo, dying goods, and other materials, and at the ſame time will provide a conſtant and uniform plenty of ſubſiſtence, as the market will be as it were at their own door: corn, potatoes, garden-ſtuff, and other proviſions, will be continually paſſing and repaſſing along the canal as markets fluctuate, and the ſcarcity of one place or market be ſupplied by the ſuperfluity of another.

3. It will greatly improve the lands, and increaſe the population of the country.

Lime, when uſed with judgment, is beyond a doubt one of the beſt manures for land, and by means of this canal may be had in great plenty, and at a very cheap rate, from one end of the canal to the other, and for ſix miles or more on each ſide of it, to the great improvement of this large and extenſive tract of country; in ſeveral parts of which little lime can be had, while in others it is ſo exceſſively dear, on account of its being brought by land carriage, that it is but rarely and ſparingly uſed. Beſides this, marle and other manures, particularly foul ſalt, might alſo be had by means of this canal, in various intermediate parts of this country, which now cannot poſſibly procure them. And that population will be increaſed, is evident from what has been ſaid before; for where manufactures are encouraged, where there is plenty of work, and plenty of wholeſome proviſions, population always muſt increaſe.

4. It will ſave an immenſe expence in land carriage.

This

This will appear evident, if the preſent price of land carriage be compared with the price propoſed to be taken for the water carriage. The price of land carriage at preſent is on an average one ſhilling per ton per mile. The price propoſed to be taken by water, for tonnage, freight, and all incident expences, is, for merchandiſe two-pence per ton per mile, or one ſixth part of land carriage; for coals, three halfpence per ton per mile, or one eighth part of land carriage; and for lime-ſtone, lime, ſlate, &c. one penny per ton per mile, or one twelfth part of land carriage. Thus, upon a medium, at leaſt ſeven parts in eight of the expences of land carriage will be ſaved to the public.

To how much this ſaving may amount, it is not eaſy to ſay with certainty; but if the profits to ariſe from the navigation, as is mentioned above, be truly calculated, and by thoſe who know the country beſt it is deemed to be rather below than above the truth, this ſaving will amount to above two hundred thouſand pounds a year.

Beſides theſe advantages, there is another ariſing from time, or from the certainty and expedition of this mode of conveying goods and merchandiſes from one place to another; an advantage well underſtood by all traders and manufacturers. For let us ſuppoſe a proper number of deck boats, built after the manner of the duke of Bridgwater's, divided into three or four convenient rooms for paſſengers and merchandiſe, of which one ſhould ſet out from Leeds, and another from Liverpool, every morning at a certain ſtated hour, and making ſhort ſtays in their paſſage at certain ſtated times and places to take in and diſcharge goods and paſſengers, theſe great towns, and the whole intermediate country, would thus have a conſtant, ſafe, cheap, and commodious conveyance of goods and paſſengers from place to place; and the whole paſſage from Leeds to Liverpool, and in like manner from Liverpool to Leeds, might be completed in three days.

But advantages no leſs great, and by far more extenſive, will ariſe to the trade and manufactures of this kingdom, by opening this ſhort, expeditious, and ſafe communication between the eaſt and weſt ſeas. The whole intermediate country between Leeds and Liverpool, and for a conſiderable extent on each ſide the canal, will be ſupplied with wool, woollen yarn, corn and proviſions, hides, tallow, &c. from Ireland, and alſo the produce of America, and whatever elſe is imported at Liverpool; and the ſame countries will alſo be ſupplied with linen, linen yarn, tin plates, deal, timber, boards, planks, iron, hemp, flax, Ruſſia linen, potaſh, and whatever elſe is imported from the eaſt country at the port of Hull, and in like manner all our exports would be equally encouraged and benefited. And though this may ſeem to affect this country in particular, by promoting its manufactures and improving its lands; yet the whole kingdom ſhares in this improvement, and the encouragement of theſe manufactures, which annually bring into it not leſs than two millions ſterling; beſides the advantage of this internal navigation from eaſt to weſt, without which veſſels would be obliged to go round the iſland *two thouſand miles or more*. In time of war, likewiſe, this communication will be a prodigious advantage to the whole trading intereſt. Upon the whole, the many advantages ariſing from this navigation from ſea to ſea are ſo many, and ſo various, and of ſuch prodigious value to the kingdom in general, as well as theſe counties in particular, that it is difficult, if at all poſſible, to form a juſt idea of them.

Having taken a ſhort view of ſome of the advantages which are likely to ariſe from this undertaking, it is neceſſary to conſider the objections: and in doing this, the two following firſt preſent themſelves; but I hope to anſwer them ſatisfactorily.

1. That ſuch a canal will injure, if not take away the properties of thoſe perſons through whoſe lands it is intended to be cut.

2. That

2. That the profits of the navigation will not equal the intereſt of the money that muſt be expended to complete it.

As to the firſt of theſe objections: It is intended that the proprietors ſhall be, by act of parliament, particularly reſtrained as to houſes, gardens, yards, parks, paddocks, planted walks, or avenues, or lawns incloſed, and adjoining to any houſe; and as to all other lands, a full and ample conſideration muſt be paid for them before the proprietors can cut into them; which conſideration, if the land-owners and proprietors cannot agree upon it, muſt be ſettled and determined by a jury of neighbours, aſſiſted and directed by a number of commiſſioners, appointed out of the moſt reſpectable and independent gentlemen in the country, not being proprietors, nor intereſted in the navigation.

As to the ſecond objection, the calculation given above, made by the moſt ſkilful and experienced men that could be employed, will be a ſufficient anſwer.

And in order to make the expence, and raiſing the money, as eaſy as poſſible, it is agreed to petition the legiſlature to have the powers veſted in a company, and to divide the capital into two thouſand ſix hundred ſhares, of one hundred pounds each, to bear an intereſt of five pounds per cent. regularly paid on a ſtated day in every year till the work is completed, when the full profits ſhall be equally divided annually, in proportion to the ſhares each perſon is poſſeſſed of; and that each ſubſcriber ſhall have a vote upon all occaſions, by himſelf or proxy, for every ſhare; and that no perſon ſhall be allowed to have more than one hundred ſhares; which will be a ſecurity againſt any partial and injurious influence in the execution of the works, or management of the company's affairs when completed.

And as the work is calculated to be finiſhed in eight years, and the money ſubſcribed will be called for only as it is expended, with an interval

terval of three months between every call, the payments will rarely exceed five or ſix per cent. at one time, as is the practice in the Staffordſhire canal; which may encourage many well-wiſhers to this undertaking to be ſubſcribers, who might otherwiſe think it inconvenient.

The act was obtained, for carrying the canal into execution, in the beginning of the year 1770, and at the latter end of the year the canal was begun; and ſuch was the expedition made in the work, that, at a meeting held at Liverpool by the proprietors, the 27th of September 1771, an account was delivered in by the engineer, that there were upwards of twenty miles of it not only cut, but alſo nearly finiſhed. The whole completed within the time limited.

I ſhall now proceed to deſcribe the courſe of this canal, its length, riſe, and fall.

This canal begins out of the river Merſey, at low water, juſt at the lower extremity of the town of Liverpool, by Bank-hall, Bootle, Letherland, and makes almoſt a half circle, and goes over the river Alt to Metling-chapel, by Mogul-chapel, and Aughton-chapel and Mill-houſe; it then takes a large half circle round the town of Ormſkirk, and croſſes Toad-brook near Newburgh, which it paſſes, and croſſes alſo the Douglas river (which runs toWigan), proceeds by Biſburn-hall and Monkhouſe, and croſſes the river Yarrow at the town of Eccleſtone (where the Kendal and Lancaſter canal breaks out to that country). It then goes on by Shaw-green, Colebrook, and Shaw-mill to Layland, over the brook near Boomer-bridge, and near Houghton-tower and Fleetwood-hall, over the river Darwent by Showley and Dewhurſt, croſſes the river Calder near Whaley, by Padiham and Pendle-hall, and again croſſes a part of the river near the town of Colne to Fouridge, where a baſin is cut to ſupply the canal, of which it is the head. The canal here begins to fall to Leeds, and goes from Fouridge by Salterford, Eaſt Mertin, and croſs the river Air near Gargrave, by Thorelſby, Sturton,

and the town of Skipton, by Bradley, Kildarick, Silſden, Burnwaite, Merton-banks, near the town of Bingley; a little below which it croſſes the river Air again, paſſes Shipley, and takes a ſemicircular courſe round Idle, near Appertin-bridge, Horsforth, Kirkſtall-abbey, by Burley and Holbeck, to the town of Leeds, making in the whole a courſe of one hundred and eight miles and three quarters. The riſe from Liverpool to the baſin at Fouridge is five hundred and twenty-five feet, and the fall from Fouridge to Leeds four hundred and forty-ſix feet.

KENDAL CANAL TO LIVERPOOL.

A Deſcription of the Canal propoſed to be cut from the Leeds and Liverpool Canal, near Eccleſtone, in the County Palatine of Lancaſter, to Kendal in Weſtmorland; ſurveyed in 1772, *by Mr. Robert Whitworth, Engineer.*

THIS canal goes out of the Leeds canal to Liverpool, at a place called the Yarrow River, near the town of Eccleſtone, and proceeds over Shaw-green to the Moſs-houſes, croſs the main road from Preſton to Liverpool, and croſs the river Ribble near Preſton; it then almoſt returns back, and goes over the river Savock by Lea town and Trails, to the town of Kirkham; it then forms a ſemicircle by Roſater and Clarkſon-green, paſſing over Hollow-ford and the river Brock, near to Brock-bridge, and croſs the river Wyre at Garſtang, over Ford-green and the river Cocker by Burrow, and cloſe by the coaſt of the Iriſh ſea to Lancaſter, over the river Lune; and again running cloſe to the Iriſh ſea, proceeds to Heſſe-bank by Sline and Botton, and over Kellet, acroſs the river Keer near Burwick, and to the town of Burton; then by Holm, Earlton, Milton, Crooklands, over Flincaſter-green, by the Forge to Natland, and into the Kent river at Kendal, near the main road to Carliſle, after a courſe of above ſeventy-two miles, and a riſe of only eighty-ſix feet ſix inches, fifty-four miles and a half of it being upon a level; a circumſtance not to be found in any of the inland navigations in England.

I ſhall

I ſhall ſay nothing of the advantages ariſing to trade and manufactures from this navigation, as that would be only to repeat what has before been obſerved: it will be ſufficient to ſay, that whatever advantages have been expected from ſimilar undertakings, have been experienced in their greateſt extent from this.

Permit me here to make one obſervation on thoſe canals which I have already deſcribed. Although it was late before we began this kind of improvement, yet the ſpirit with which they have ſince been carried on, proves the truth of the obſervation of foreigners, that our inventions are very confined, but our improvements on the inventions of others rapid and ſurpriſing. Whoever had ſuggeſted the idea of an inland navigation from Kendal in Weſtmorland to London, before the utility of inland navigations was properly underſtood, would have been conſidered as a viſionary, and his undertaking would have been treated rather as the project of a madman, than the practicable deſign of an able engineer; and yet the latter appears to be the fact, and the thing has been effected without ſuch an idea having at firſt ever entered into the minds of thoſe by whom it was begun.

The courſe of this navigation is well deſerving our attention.

From the extremity of this canal, at Kendal in the county of Weſtmorland, it is carried on by the town of Lancaſter into the Leeds and Liverpool canal at Eccleſtone, down to Liverpool, from thence up the river Merſey into the duke of Bridgwater's canal as far as Preſton-brook; there the Staffordſhire canal breaks off, which joins the river Trent to the Severn; but the navigation to London is ſtill carried forward by the Coventry canal, which continues the line to where the Oxford canal commences, which continues it to the river Thames, and by that river it is brought forward to London; being a courſe of inland navigation, reckoning all the windings, of very near FIVE HUNDRED miles extent.

If

If theſe vaſt undertakings are conſidered as accompliſhed by private adventurers, perhaps there are none ſuch of equal extent to be found in the world (for in other countries they are generally completed by government); and yet we have no reaſon to believe that the cutting of canals is yet at a ſtand in England. There are ſtill many tracts of country that may be advantageouſly connected, and which probably will be ſo connected in the courſe of a very few years. The junction, for inſtance, of the Nene and Avon, by a canal from Peterborough to Rugby, which would join the Nene and the Severn in a direct line, and the Nene and the Thames collaterally, is an undertaking, the expence of which would be very inconſiderable, in compariſon with that of other navigations that have lately been completed.

A canal navigation is alſo in contemplation from Biggleſwade in Bedfordſhire to Hertford, to join the river Lea navigation to London.

A plan has been ſuggeſted for uniting the Lynn navigation, which already is carried to Cambridge, to the river Lea and Stortford navigations, which are now navigable to Biſhop-Stortford in Hertfordſhire, a diſtance of not above thirty miles. This might be done at the expence of about twenty thouſand pounds *; and although the attempts to carry this ſcheme into execution have been fruſtrated by two noble landowners, yet the author of this hiſtory has pointed out a courſe which ſuch a navigation might take, by being carried near the town of Royſton, by which the trade of that great town would be eaſily conveyed to London, Cambridge, and Lynn, by water-carriage; and all the obſtructions which this navigation has met with from thoſe noblemen, and from the town and univerſity of Cambridge, who oppoſed the laſt petition preſented to parliament in 1790, will be entirely

* See a Treatiſe on Inland Navigation by the author of this hiſtory, printed in 1785, by Hooper, Holborn, containing a plan for a canal to be cut from London through the interior parts of the counties of Eſſex, Suffolk, and Norfolk, to the city of Norwich, and to Lynn; and for extending the navigation from Biſhop-Stortford to Cambridge.

avoided; and as its utility cannot but be manifeſt, I make no doubt there would then be more petitions in its favour than there were before againſt it.

But not to confine myſelf to England; the countries of Scotland and Ireland are alſo improving by canals, as is likewiſe Wales. An act of parliament was very lately paſſed for a canal from Cardiff to Merthyr Tidvill, a diſtance of twenty-five miles; and an application is intended for another act, for a canal to be cut from Neath to Furno Vaughan, being thirteen miles.

I am alſo willing to entertain hopes that government will undertake the cutting of a grand canal from the river Thames to Southampton, and conſequently to Portſmouth, by which a certain and expeditious communication from the metropolis, and the dock-yards of Chatham, Sheerneſs, Woolwich, and Deptford, with that at Portſmouth, may be obtained, without ſhips being obliged to go round the Foreland, the Downs, and Down Channel, againſt tempeſtuous or adverſe winds, in time of war; and the convoy which is employed on that ſervice, may be uſed for other purpoſes, ſuch as the victualling the fleet at Spithead. Stores and all other articles may alſo go by this inland navigation.

And as the courſe of a canal has been ſurveyed and found practicable from Andover to Redbridge, and that of another from Baſingſtoke to Weybridge in Surry, and the Thames (which I ſhall next particularly deſcribe), and which has been objected to by ſome intereſted perſons, I would wiſh theſe alſo to be undertaken by government; for no private inconvenience ſhould ſtand in competition with the public good, eſpecially as a proper value is paid for the land taken away. This canal, ſhould it ever be completed, will, I hope, be ſufficiently broad and deep to admit of large veſſels of burthen, that will bear both tide-ways, without ſhipping and tranſhipping, which is both troubleſome and expenſive. Then may we expect to ſee the noble oak timber growing in the internal

internal parts of Hampſhire and other adjoining counties, and which is now almoſt uſeleſs on account of the heavy expence attending conveying it to the dock-yards, brought by cuts branching from the grand canal, by a cheap and ready conveyance, to places where the want of it has been for ſome years ſeverely felt.

BASINGSTOKE CANAL.

An Account of the intended navigable Canal from Baſingſtoke in Hampſhire, to the River Wey near Weybridge, in the County of Surrey.

A CANAL from Baſingſtoke was firſt propoſed in the year 1772, and a petition was then preſented to parliament; but it was not intended that it ſhould communicate with the river Wey near Weybridge, but with a canal that was then propoſed to be made from Reading to Monkey Iſland, near Maidenhead, in the river Thames, by the corporation of Reading, and from thence to be continued by the corporation of the city of London to the river Thames at Iſleworth; but through the oppoſition of the land-owners, and other landed gentlemen, who had not diſcernment enough to ſee their own intereſt, the whole ſcheme was fruſtrated.

But the plan now offered meets with a more favourable reception from the land-owners; for out of the great number of the different proprietors of land through whoſe grounds this canal is to paſs in a courſe of forty-three miles and three quarters, there are but two diſſenting voices.

This canal promiſes to be of great public utility, by furniſhing an eaſy conveyance to the London market, and to the public dock-yards for vaſt quantities of timber, which at this time lies uſeleſs in the country for want of ſuch conveyance.

This canal is to begin at Baſingſtoke, from the little river Loddon, and at a place called Newman Springs, by the village of Baſing; thence it is to paſs round and acroſs the road at Newham, and take a ſharp turn round Tilney-hall and park, down almoſt back again to near the town of Odiham, into the little river called Deepford; whence it will proceed round Degmersfield-park to near Crookham, ſtraight along by Alderſhot, over Dead-brook, which divides the counties, and thence turn up to Colingley-moor, and return by Purbright and Oak-farm into the river Wey, near the little village of Weſtley. Its length will be very near forty-four miles.

ANDOVER CANAL.

An Account of a navigable Canal propoſed from the Town of Andover to Redbridge, near the Town of Southampton, in the County of Hampſhire.

THIS canal was ſurveyed in the year 1770, and found to be practicable and eaſy, and in 1771 a petition was preſented to parliament for leave to bring in a bill to carry this uſeful ſcheme into execution; but nothing has yet been done, on account of ſome objections being made about the lands to be purchaſed, and the damages that might be ſuſtained by particular perſons, although the advantages that would accrue to the kingdom in general, and this part of the country in particular, are very conſiderable and apparent, not only from the general reaſon of the thing, which I before have mentioned (for trade will always find its way where there are conveniences for it), but alſo from a well-known fact, that before the navigation was made at Newbury, the markets at Andover were very large, and a very great corn-trade was carried on there; but from that time it has declined, and is now in a manner loſt, inſomuch that the farmers carry their corn even from thence to Newbury; but when the propoſed canal from this place to Redbridge ſhall be made, the trade will of courſe return to its old channel, eſpecially as

it

it will open a more eaſy and cheap communication with London and Briſtol; ſo that as the Newbury navigation took the trade away from Andover, this new canal will effectually reſtore it, and new ſources of trade will moſt probably be diſcovered.

This canal was to begin at Barrow's Mill, and take in Pillhill Brook, proceed by Upper and Lower Clattford, Weſtover, and round the village of Fullerton, at Kitcomb Bridge, by Lakeford, and through the town of Stockbridge, by Park Farm, Mitchimus, and Tinſbury, by Great Bridge to the town of Rumſey; and thence croſs the great road from Saliſbury to Wincheſter and Lower Aſhford, by Grove-place and ſtreet to Redbridge into the Hampton-water; being a courſe of twenty-two miles and a half, and a fall of one hundred and ſeventy-ſix feet nine inches.

WINSTON CANAL TO STOCKTON ON TEES.

An Account of a navigable Canal from the Town of Winſton, on the River Tees, by the Town of Darlington to Stockton, on the ſame River, all in the Biſhopric of Durham.

THIS canal was ſurveyed in 1768 by Mr. Robert Whitworth, and was intended to have been carried into immediate execution; but a ſufficient ſubſcription could not then be raiſed, it being feared that the tolls for the goods that were likely to be carried upon it would not pay the ſubſcribers ſufficient intereſt for their money; but theſe apprehenſions have been ſo ſatisfactorily anſwered by ſome gentlemen who are well acquainted with that country, and have made calculations of the prodigious quantities of coals, lime, and lead, beſides other merchandiſe that would be carried upon ſuch a canal, that it is now beyond a doubt that it would pay the undertakers as well as any canal made or now making in the kingdom, that of Birmingham only excepted (the tonnage of which amounts to more than eleven thouſand pounds per annum); and it is not clear whether it would not even exceed that.

The

The courſe of this canal is to go out of the river Tees at or very near Winſton, and running north to very near Staindrop, turn weſterly to Kitterby, by Legg's-croſs to near Lower Walworth; from thence by Cockerton to Darlington, and croſs the high road to Durham, and alſo croſs the river Skearn; and thence to Bank-top, and along Maiden-dale to the Fighting Cocks near Oak-tree and Moor-houſe by Cotham-Stob and near Hartburn, into the river Tees at the town of Stockton; being a courſe of near twenty-ſeven miles, with a fall of three hundred and twenty-eight feet.

There is to be a branch from the main canal, near Lower Walworth, to Pierſe-bridge into the Tees, of one mile and three quarters; and another cut from Darlington to Croft-bridge on the Tees, of three miles; and another cut from Cotham-Stob to Yarm, of near two miles; which together, when finiſhed, will make the completeſt canal in the kingdom.

CHESTER CANAL.

An Account of the navigable Canal from the City of Cheſter to Middlewich, and into the great Staffordſhire Canal near that Town; and alſo of the Branch to Nantwich.

THE courſe of this canal was ſurveyed in the years 1767 and 1769, and again in 1770, by ſeveral ſurveyors and engineers; and at the latter end of the year 1769, application was made to parliament, for an act to complete the ſame, by the corporation and gentlemen of Cheſter; but at that time their petition was not attended with ſucceſs. In the latter end of the year 1770, application was again made to parliament, and an act obtained, but with this extraordinary reſtriction, that the intended canal ſhould not unite or communicate with the Staffordſhire canal at Middlewich. The canal was begun in April 1772, and completed in a very ſhort time, and is productive of great advantages to the city of Cheſter, and alſo to the country through which it paſſes.

The

The courſe of this canal is out of the river Dee at Cheſter, acroſs the main road leading to Warrington, by Chriſtleton and Waverton, Hargrave, Hexley, and over Braſſey-green, near Beeſton-caſtle, to Tiverton; and about two miles and a half further, nearly due weſt, it turns to nearly northerly by Calmton and Page's-wood, over Lea-green, and by Lea-hall and Clive-green, over the little river Wallage to Middlewich. The branch that goes off about two miles and a half from Tiverton, turns, to the right, ſouth-weſt to Hurleſton, Acton, and Nantwich; going a courſe, with the branch, of twenty-ſix miles and three quarters. Its riſe from Cheſter, to where it branches to the right and left, is one hundred and ſeventy feet ten inches, and the fall to Middlewich is juſt forty feet: from thence to Nantwich is a dead level.

BIRMINGHAM CANAL.

An Account of the Birmingham Canal to the River Severn, or rather into the great Staffordſhire Canal, at Alderſley near Wolverhampton, in the County of Stafford; ſurveyed in 1774, *and carried into immediate execution.*

THIS canal begins at Birmingham, and proceeds to Winſon-green and Smethwick, by Blue-gates, Weſt Bromwich, Oldbury, over Puppy-green, by Church-lane, Tipton, and Bilſton; by the ſkirts of the town of Wolverhampton, and by Goſbrook-mill into the canal from the Trent to the Severn at Alderſley; being a courſe of twenty-two miles and a half, with a riſe from Birmingham to Smethwick of thirty-ſix feet, and a fall from Smethwick to Alderſley of one hundred and fifty feet eight inches. Out of this canal, at Weſt Bromwich, there is a cut or branch which paſſes over Gut's-green, Ryder's-green, and Brick-houſe-lane, to the collieries at Wedneſbury; being four miles and three quarters, with a fall of thirty-ſix feet.

The

The other canals to the ſeveral coal-mines and towns were ſurveyed in 1775. A canal commences about a mile from the town of Dudley, near the engines which are next Netherton-hall, and proceeds acroſs Knowl-brook, and along Dudley-wood ſide, through Urchill-coppice and Brierly-hill coppice to Black Delft, and, taking a large circuit round Brierly-hill church, and acroſs Brittle-lane, between the fire-engine and Seaton's engine, falls into a canal on the left of Brockmore-green, which comes from the right from Bromley-fenns and Penſnett-chace, where there is a large reſervoir of water, for a head to the navigation, of near twelve acres. It thence proceeds almoſt in a ſtraight line to Wordſley, acroſs the high road from Stourbridge to Hampton, along Wordſley-field, and acroſs the river Stour, which runs up to Stour-bridge, and runs on the left by Bell's-mill, through Affcott-meadows into the grand trunk, at thirty-four miles from the Trent navigation, and twelve miles from the Severn. At the elbow and confluence of the river Stour with the river Smeſtall, very near Stourton, a branch goes off to the left by Wordſley-field, along Addenham-bank, by Woollaſton, Holloway-head, round Sot's-hole, into the river Stour, at the extremity of the town of Stourbridge. The diſtances and falls are as follows:

From the junction of the Wolverhampton canal to that of the Dudley canal, five miles, and the riſe one hundred and ninety-one feet three inches; the branches to Stourbridge and to Penſnett reſervoir are two miles one furlong, and level; from the Wolverhampton canal to the reſervoir on Penſnett-chace the diſtance is ſix miles one furlong, and the riſe one hundred ninety-one feet three inches; from Stourbridge to the branch of the reſervoir, one mile and a quarter, and level.

LANGLEY BRIDGE CANAL.

Account of a navigable Canal from Langley Bridge, in the County of Derby, to the River Trent, near Sawley Ferry, in the County of Nottingham.

AT the time when the navigable canals were making in the interior parts of the country, it was propoſed by the gentlemen and owners of the extenſive coal-mines in the neighbourhood of Heaner, Langley, Eaſtwood, Awſworth, Coffaw, Ilkiſton, &c. to carry their coals to the river Trent, which, for want of a water-conveyance, lay uſeleſs both to the owners and to the public. Accordingly a ſurvey was made, a plan drawn, and an eſtimate of the expence made, in 1776; but it was not till 1777 that an act was obtained for carrying the ſcheme into execution.

This canal paſſes by all the above coal-works or mines, and is carried over Nutt-brook, by a water-bridge or aqueduct, to Stapleford and Sandy-acre, and acroſs the main road from Nottingham to Derby, and by Long Eaton into the river Trent, nearly oppoſite where the branch to the river Soar takes its departure, and not far from Sawley-ferry; after a courſe of eleven miles and three quarters, with a fall of one hundred and eighty feet eight inches.

CHESTERFIELD CANAL.

A particular Deſcription of the navigable Canal from Cheſterfield, in the County of Derby, to the Trent at Stockwith, in the County of Nottingham, below Gainſborough.

THAT able and experienced engineer, the late Mr. Brindley, in the year 1769, projected this canal, ſurveyed the ground, and delivered in an eſtimate of the ſum requiſite for its completion, which he ſtated

at one hundred thouſand pounds. The plan met with general approbation, and an act of parliament was obtained for carrying it into execution in the ſpring of 1770; and notwithſtanding the act prohibited the proprietors from beginning the work till the ſum of one hundred thouſand pounds was ſubſcribed, this canal was conceived to be of ſuch great utility by the gentlemen, land-owners, and owners of coal-works, that that ſum was ſubſcribed as ſoon as the contents of the act were known. The work was therefore immediately begun, and carried on under the direction of Mr. Brindley to the time of his death, and ſince that time continued and completed by Mr. Henſhall. In the courſe of this canal, the engineer has had numerous difficulties to encounter; the principal of which is in the neighbourhood of Hartſhill, where the canal is carried under ground for near three thouſand yards.

This canal is of ineſtimable advantage to the neighbouring country, in conveying coals, lead, ſtone, lime, and other heavy articles; which are now carried at one fifth part of the uſual price of land-carriage, and with equal expedition. It has alſo produced to the ſubſcribers a profit exceeding their moſt ſanguine expectation, notwithſtanding ſome diſcontented perſons had pretended to foretell, that the trade carried on upon it would be ſo trifling that it would not pay the ſubſcribers common intereſt for their money.

The courſe of this canal begins at Cheſterfield, and proceeds by Rickett's-mill, near Staveley-forge, by Staveley-town and coal-works, the Hague, and near Eckington and Killmarch, to the beginning of the tunnel at Hartſhill; and at the length of three thouſand yards comes out again near Peck's-mill, and proceeds then by Shire Oaks to Work-ſop, acroſs the Royton river at Kilton. It thence takes a circuit to near Bilby-hall, and round again to Balworth, and all round the town of Retford, except a very ſhort ſpace; and then turns from the ſouth-weſt to due north, and paſſes by Welham, Charleborough, Clowarth, and, round Grindley on the Hill, to Miſterton, into the river Trent, near Stockwith;

Stockwith; after traverſing a courſe of forty-four miles and three quarters, with a riſe of forty-five feet from Cheſterfield to Norwood, and a fall of three hundred and thirty-five feet from Norwood to the river Trent.

BUDE CANAL TO LAUNCESTON.

Extract from an Act of Parliament, paſſed in 1774, *for making a navigable Cut or Canal from the Port or Harbour of Bude, in the Hundred of Stratton, in the County of Cornwall, to the River Tamer, in the Pariſh of Calſtoke, near the Town of Launceſton, in the ſaid County.*

THE act nominates thirty truſtees for completing the canal, by the following courſe: From the port or harbour of Bude, in the pariſh of Marſham Church, in the county of Cornwall, through the ſeveral pariſhes of Marſham Church, Pounds-toke, Flyke, St. Mary Whiteſtone, Launcells, Bridgerule, North Tamerton, Boyton, Werrington, North Pitherwin, Tremain, Egleſkerry, St. Thomas, St. Mary Magdalen, St. Petherwin, Trewain Laneaſt, Alternon Lawanick, North Hill, Linkintrom, Stoke Clemſland, and Calſtock, in the counties of Cornwall and Devon, to the river Tamer in the pariſh of Calſtock, in the ſaid county of Cornwall.

The powers of the proprietors are next aſcertained, which are ſimilar to thoſe granted by other acts of the ſame kind. A particular clauſe ſtates, that the cut or canal be carried under ground, and arched over ſo as to ſupport the ground lying thereon, for a ſpace of three hundred feet, near to the manſion-houſe of Whiteford, in the pariſh of Stoke Clemſland. The land to be uſed for the canal, not to exceed ſixty-three feet in width, towing-paths included, except for making a dock or baſin; nor to be of a greater depth than thirty-nine inches from the preſent level or ſurface of the ground; and in ſuch places where it ſhall be judged neceſſary for boats and other veſſels to turn, lie in, or paſs each other, or where any engine or crane may be erected, not above twenty

poles in breadth. Bodies politic or corporate empowered to ſell or exchange lands. Commiſſioners appointed to ſettle differences; and if they cannot agree, a jury to be appointed. Perſons guilty of perjury, to be proſecuted. Perſons wilfully deſtroying or obſtructing the navigation, engines, &c. to be adjudged guilty of felony. Mines and minerals to belong to the lord of the manor. Proprietors to make drains and watering-places for cattle. Towing-paths to be fenced in. No wharfage to be paid for goods or merchandiſe that ſhall not lie longer on the wharfs than twenty-four hours; and no more than two-pence per ton be taken for wharfage of coals, ſtone, ſand or bricks, nor more than three-pence per week per ton for the wharfage of any other goods and merchandiſe. Proprietors may raiſe the money among themſelves to make the cut or canal, not exceeding forty thouſand pounds, to be divided into four hundred equal ſhares of one hundred pounds each; and no perſon to have more than twenty ſhares, and to have a vote for every ſhare; and if the ſum of forty thouſand pounds is not ſufficient to complete the ſaid canal, the proprietors are empowered to borrow twenty thouſand pounds more, or admit new ſubſcribers to that amount. The canal-duty for every ton of ſlate, ſtone, ſand, culm, coals, timber, or any kind of manure or fuel, not to exceed two ſhillings, nor three for every ton of any kind of goods, wares or merchandiſe; and ſo in proportion for any greater or leſs quantity than a ton. Commiſſioners may leſſen or advance the tolls. With reſpect to timber, forty feet of round, or fifty feet of ſquare oak, aſh or elm, or fifty feet of fir or deal, balk, poplar, and other timber-wood, ſhall be deemed one ton weight; and twenty hundred, avoirdupois, to be deemed and taken for one ton of ſtone, lime-ſtone, bricks and coals. The navigation to be free on payment of the rates. The company of proprietors reſtrained from leaſing the canal or tolls, or from being concerned in any veſſels carrying goods for hire, under the penalty of fifty pounds. Names of owners to be put on the boats; and maſters or owners to be anſwerable for damages. Penalties of five pounds to be levied for wilfully opening ſwivel or draw-bridges to interrupt travellers; and a penalty of five pounds

for

for every inſtrument to deſtroy fiſh. Proceedings to be without ſtamps. If the company do not finiſh the canal in ten years, or diſcontinue it for five years, the owners may have their lands again, if they chooſe to purchaſe them. Perſons aggrieved may apply to the quarter-ſeſſions.

This canal, according to the beſt information I have been able to procure, is not finiſhed; becauſe the chief commodity of traffic would be coals from Wales; on which account, though coals are very much wanted on the whole length of the canal, the ſubſcribers are fearful of undertaking it.

CANAL FROM MARKET WEIGHTON TO THE HUMBER,

In the Eaſt Riding of Yorkſhire.

Extract of an Act paſſed in 1772, *for draining and preſerving certain Commons, low Grounds and Cars in the Pariſh of Market Weighton, and other adjacent Pariſhes in the Eaſt Riding of the County of York; and for making a navigable Cut or Canal from Market Weighton to the River Humber.*

THE preamble to this act is as follows: Whereas certain commons, low grounds and cars, within or near the villages, townſhips, or pariſhes of Market Weighton, Blacktoft, Everingham, Harſewell, Seaton, Roſs, Holme upon Spalding-moor, Froggathrope, Gribthrope, Spaldington, Burſea, Haſholm, Wholſea, North Cliffe, South Cliffe, Hotham Houghton, Bromfleet, Faxfleet, Shipton, Sancton, and alſo a certain common called Walling Fenn, containing twenty thouſand acres, are ſubject to be overflowed, and unprofitable to the proprietors: and whereas the draining of the ſaid commons, low grounds and cars, and the making the main principal drain navigable from the river Humber, at or near a place called Foſſdike Clough, ſituate on the banks of the ſaid river, will be of great utility to the public; but the ſame cannot be effected without the aid of parliament: May it therefore pleaſe your Majeſty, &c.

This being an act for draining a large tract of country of twenty thouſand acres or more, as well as for making a navigable canal, it neceſſarily differs from the canal-acts in general. The extract I ſhall make ſhall be as ſhort and conciſe as poſſible.

The act ſets out with naming commiſſioners for draining the ſaid lands, and cutting the canal; and then nominates a great number of truſtees for the drainage and navigation. No perſon to be a truſtee who ſhall not advance a ſum not leſs than two hundred pounds for the purpoſes of the navigation. Commiſſioners intereſted in the commons, low grounds, or cars, incapable of acting. Commiſſioners to have one general annual meeting. Truſtees to have no place of profit, and to defray their own expences. Commiſſioners may make cuts and drains, and maintain the ſame, ſo that no water flowing from Londeſbrough into the Foulney be diverted or turned into the ſaid navigable canal, before the ſame water ſhall have entered the Foulney. Bridges, gates, ſtiles, fences, paſſages and tunnels to be made and kept in repair. Commiſſioners to ſettle all diſputes, and determine boundaries of commons. Several dams to be taken away, or kept up, at the commiſſioners choice. The commiſſioners ſhall begin the navigable canal at or near Foſſdyke Clough, ſituate on the banks of the river Humber, and finiſh and complete the ſame progreſſively upwards to Market Weighton. The works for the navigable canal not to prejudice the drainage. No lock to pen up the water higher than three feet of the natural ſurface of the land. Owners and proprietors of commons, low grounds or cars, may, at their own coſts, cut drains or canals, in, on, or over their own grounds, ſo as not to prejudice the main canal for navigation. Tolls to be taken, not exceeding four ſhillings for every ton of grocery goods, wares and merchandiſes; two ſhillings for every chaldron of coals, containing thirty-two buſhels; one ſhilling and ſix-pence for every chaldron of lime of thirty-two buſhels; one ſhilling for every ton of ſtone; ſix-pence for every ton of manure of all ſorts; two ſhillings for every thouſand of tiles; one ſhilling for every thouſand of bricks; and eight-pence for every

pack

pack of wool, containing ſixteen ſtone to each pack; to be paid in proportion of the diſtance; the whole being payable from the Humber to Market Weighton. No tolls to be paid by boats for pleaſure, or veſſels laden with materials for the purpoſes of drainage or navigation. Commiſſioners may compute the charges of drainage and navigation reſpectively, and allot each proprietor his ſhare of the tolls. Commiſſioners, after the works are completed, to divide and arrange the number of acres of each proprietor into different ſpecies of land, and tax accordingly. Taxes may be laid, to maintain the works. A further ſubſcription, if wanting, to be raiſed without reſtriction, by admiſſion of new ſubſcribers, or among themſelves. Truſtees to appoint officers. Officers not accounting to be liable to a penalty. Boats to be meaſured, numbered and marked. Maſters to be anſwerable for damages done by the crews. Navigation to be free, upon payment of rates. Tolls exempt from taxes. Breaking locks or gates, or damaging the works, to be felony. Exemption granted from ſtamp-duties.

This canal is finiſhed, and turns out greatly to the advantage of the land-owners and proprietors, not only in draining the lands, but by facilitating the carriage of the produce and manufactures of a large extent of country, which before were carried at a very great expence by land-carriage.

SIR NIGEL GRESLEY's CANAL.

In the year 1775, an act was granted to enable Sir Nigel Greſley, bart. and Nigel Bowyer Greſley, eſq. his ſon, to make and maintain a navigable cut or canal from certain coal-mines in Apedale to Newcaſtle-under-Line, in the county of Stafford.

The preamble of the bill is as follows: Whereas Sir Nigel Greſley, baronet, and Nigel Bowyer Greſley, eſquire, ſon and heir-apparent of the

the ſaid Sir Nigel Greſley, are proprietors of ſeveral conſiderable mines, rows and veins of coal, ſituate within the manor of Apedale, in the county of Stafford: and whereas the making a navigable cut or canal from the ſaid coal-mines to Newcaſtle-under-Line, in the ſaid county, will be of particular advantage to the inhabitants of the ſaid town, and parts adjacent, and of public utility: and whereas the ſaid Sir Nigel Greſley and Nigel Bowyer Greſley are the proprietors of a conſiderable part of the land through which the ſaid cut or canal is propoſed to be made, and are willing and deſirous, at their own expence, to make and maintain ſuch cut or canal: May it therefore pleaſe, &c.

Then follow the uſual clauſes of all navigation acts. The width of the canal and towing-paths, and the ditches, drains and fences, not to exceed twenty-ſix yards, except in ſuch places where the ſaid cut or canal ſhall be raiſed higher, or cut more than —— feet deeper than the ſurface of the land; and in ſuch places where it ſhall be judged neceſſary for boats and other veſſels to turn, lie, or paſs each other, or where any crane may be erected, not to exceed ſixty yards. The proprietors are alſo to engage to deliver coals from their coal-mines as aforeſaid, at the town of Newcaſtle-under-Line, to the inhabitants thereof, at the price of five ſhillings for each ton of twenty hundred weight of ſix ſcore pounds avoirdupois weight, for a term of twenty-one years; and for five ſhillings and ſix-pence per ton for a further term of twenty-one years after the expiration of the ſaid firſt mentioned term, and ſo in proportion for any greater or leſſer quantity than a ton. And they alſo oblige themſelves to keep a ſtock at their wharf at or near the ſaid town of Newcaſtle, for ſufficient conſumption of the town and its inhabitants, under a penalty of forty pounds; and if any of the inhabitants want a leſs quantity than a ton, they are to be delivered to them at three-pence halfpenny per hundred weight of ſix ſcore. A clauſe is alſo inſerted, that the commiſſioners, on proof of great expences, &c.

may

may raiſe the price of coals, the ſecond term of twenty-one years, to ſix ſhillings per ton.

EARL OF THANET's CANAL.

IN the year 1773 an act paſſed to enable the right honourable Sackville earl of Thanet to make a navigable cut or canal from a place called the Spring, lying near Skipton Caſtle in the county of York, to join and communicate with the navigable canal from Leeds to Liverpool, in the cloſe called Hebble End Cloſe, in the townſhip of Skipton, in the ſaid county of York.

The preamble to the act ſets forth, that whereas the owners and occupiers of land, and others the inhabitants at or near Leeds, Bradford, Bingley, Keighly, Sillſden, and other places lying contiguous to the ſaid canal, have occaſion for, and frequently are in great want of lime and lime-ſtones for the improvement of their lands and other purpoſes; and the right honourable earl of Thanet is poſſeſſed of grounds near the caſtle of Skipton aforeſaid, in which are great quantities of lime-ſtone rocks, and which are ſituate within the diſtance of five hundred and thirty yards or thereabouts from that part of the canal which lies neareſt to the town of Skipton; and whereas it is very practicable to make a navigable cut or canal for the navigation of boats and other veſſels from the aforeſaid ſpring of the earl of Thanet which joins to the lime-ſtone rocks, through the lands, grounds and waſtes of the ſaid earl, and other land belonging to the free grammar-ſchool at Skipton aforeſaid, to join and communicate with the ſaid navigable canal from Leeds to Liverpool at a place called Hebble End Cloſe, in the townſhip of Skipton; and whereas to accommodate the aforeſaid towns, places and inhabitants, as alſo the adjacent country, with lime and lime-ſtone from the ſaid lime-ſtone rocks, the ſaid earl is deſirous of cutting a canal at his own expence, and to keep and maintain the ſame, together with the roads and

towing-paths; but the ſame cannot be effected without the aid of parliament; be it enacted, &c.

The act is very ſhort; the canal going entirely through his lordſhip's grounds, except Hebble's-cloſe-field, which belonged to the free grammar-ſchool at Skipton. Arbitrators were appointed for the ſaid purchaſe; and the act provides, as uſual, for the making of bridges, towing-paths, aqueducts, tunnels, &c. &c. &c.

WALES.

WALES is capable of great improvements by canals, but has been long neglected for want of proper encouragement. Her mines of coals, copper, lead, iron-ore, and others of leſs conſequence, are inexhauſtible; and the contents of her mountains, even in this enlightened age, are ſtill unknown. The valuable timber which this country produces, although ſo much wanted for ſhip-building, decays as it ſtands; and the produce of the mine, in many places, lies in its natural ſtate for want of a proper conveyance to a market. The improvements made by canal navigations in the counties bordering on the noble river Severn have rouſed, at laſt, a laudable ſpirit of adventure in the gentlemen land-owners in a part of South Wales, which beyond a doubt will be crowned with ſucceſs, and create an emulation for improvements in other parts of the country, equally capable of them. And although this kind of improvement is as yet but in its infancy, it is to be hoped it will meet with proper encouragement from thoſe whoſe intereſt it is to promote the welfare of their country; ſince by ſo doing they promote their own. And although the canal I allude to is the firſt that has been cut in Wales, I hope it will be found ſo advantageous to the proprietors as to induce others to follow their example.

An act was paſſed in 1790, for cutting a canal from Cardiff to Merthyr

thyr Tidwell, being a diſtance of twenty-five miles. It is to begin at Pennarth, near Cardiff, and to paſs Llandaff and Pielly-bridge to Merthyr Tidwell, and will take in thoſe iron furnaces which are already at work: new ones will alſo be erected. As a conveyance to a market for ſuch heavy and bulky articles was all that was wanting, the mines of coal, and rocks of lime-ſtone which before lay uſeleſs to the owner, will now find, by this ready conveyance, a proper conſumption; and improvement will be extended ſtill further into the country. But as this canal is only juſt begun, the profits and advantages are at preſent only ſpeculative; although the greateſt benefit and utility may be expected from the undertaking, which is now carrying on with the utmoſt vigour, near two hundred men having been ſet to work on it immediately after the act had paſſed.

Another canal, from Neath to Furno Vaughan, is not only in contemplation, but a bill is prepared, and ready to be preſented to parliament, for leave to cut a canal, which will be equally advantageous with the former. The length of this canal will be about twelve miles; and it may juſtly be expected that it will prove of the greateſt utility. Iron-works will be erected, mines of coals will be opened, and rocks of lime-ſtone removed; all of which will be rendered advantageous to the proprietor, and uſeful to the neighbouring country.

Two ſmall canals through private property have been already cut, to the great emolument of the proprietors: one of them from near Swanſey through a moraſs to Meath; nearly three miles. The other from the town of Kidwelly to a mine of coals and a mountain of lime-ſtone, in the eſtate of a Mr. Keymer, at whoſe expence it has been cut. It is between three and four miles in length; and at the ſame time that it enriches the worthy land-owner, is of the utmoſt utility to the inhabitants of that and of the neighbouring country.

CHAP. XII.

Account of the Canal from the Forth to the Clyde, in Scotland.—Such a Canal propoſed in the Reign of Charles II.—Begun under the Direction of Mr. Smeaton in 1768.*—Collateral Canal cut from the grand Canal to Glaſgow.—The grand Canal completed in* 1790, *under Mr. Robert Whitworth.—Extracts from a Pamphlet on the Navigation between the Rivers Forth and Clyde.—Account of the Length, Riſes, Falls, Locks, Tonnage, &c. on the grand Canal.—Account of an intended Canal between Loch Gilp and Loch Crinian.—Account of an intended Canal between Inverneſs and Fort William.*

SCOTLAND.

FORTH AND CLYDE CANAL.

THE ſcheme for joining the two rivers, Forth and Clyde, was originally propoſed ſo long ago as in the reign of Charles II. It was revived again in 1723, and a ſurvey was made by a Mr. Gordon; but, on account of the magnitude of the undertaking, it was again laid aſide. In 1762 lord Napier employed Mr. Robert Mackell to make a ſurvey and eſtimate of a canal, which ſhould leave the river Clyde at Yocker Burn, about five miles below Glaſgow, and join the Forth within about two miles of the mouth of the river Carron.

Encouraged by Mr. Mackell's favourable report, the board of truſtees for the encouragement of the fiſheries and manufactures in Scotland, employed Mr. Smeaton to make a ſurvey, which he did in 1764; but the expence appearing too great, it was judged the trade would not be

adequate to the payment of the money neceſſary to complete the work.

Meſſrs. Mackells and Watt were therefore employed to project a ſmall canal from Glaſgow (from whence it was judged that moſt of the trade would ariſe) to the river Forth. Their report and eſtimate were publiſhed in London in 1767. The country gentlemen diſliking the idea of a ſmall canal to terminate at Glaſgow, Mr. Smeaton was again deſired to re-examine the ground, and to give his report on a large canal, ſuch as would carry the common coaſting veſſels quite acroſs from ſea to ſea; as they rightly judged, that by ſuch a canal a very conſiderable trade would be promoted between the weſt coaſts of Great Britain and th aſt coaſt of Ireland.

Some difference in opinion having ariſen between Mr. Smeaton and ſome friends to the project, Meſſrs. Brindley, Goldborne, and Yeoman, were called in, and gave their opinion on the ſubject, which was afterwards reviewed by Mr. Smeaton, who ſo completely refuted the arguments of thoſe gentlemen, that the proprietors, ſenſible of his ſuperior abilities, put the whole under his direction. A ſubſcription was accordingly ſet on foot, and an act of parliament obtained to carry the plan into execution.

A ſhort extract from Mr. Smeaton's report to the honourable the truſtees for fiſheries, manufactures, and improvements in Scotland, relative to the practicability and expence of joining the rivers Forth and Clyde by a navigable canal, cannot but be acceptable to the reader.

" The great utility of a navigable canal, or communication between the eaſt and weſt ſeas, has given occaſion to the forming of ſeveral projects for this purpoſe in different parts of the kingdom of Great Britain; the principal of which are, the junctions of the Thames with the Severn; the

the Trent with the Severn; the Trent with the Weaver; the Calder with the Merſey; and the Forth with the Clyde: but from what I have ſeen and heard of theſe matters, I am well convinced that by far the eaſieſt to be accompliſhed, not only in point of diſtance, but in point of perpendicular height, is the laſt: and it is ſomewhat remarkable, that notwithſtanding the country at this place lies in general as high, if not higher, than any of the reſt, yet through this high ground there happens to be two different paſſages, both lower than any of the others, and both of which have ſo great an appearance of equality in point of practicability, that upon ocular ſurveys it has remained a doubt which of the two ought to be preferred.

" One of theſe paſſages is from the river Carron, by way of the water of Bonnie, through the bog of Dolater into the Kelvin, and from thence into the Clyde, by the way of the Yocker Burn.

" The other is by following the river Forth ſome miles above Stirling, and then croſſing over through the bog of Bollat into the water of Enrick, down to Loch Lomond, and from thence by the river Leven into the Clyde at Dumbarton; and as I have, by order of the honourable the truſtees for fiſheries, manufactures and improvements in Scotland, been at ſome pains in taking proper obſervations, in order to determine the preference of theſe two paſſages, I ſhall firſt endeavour to ſettle this queſtion, and then proceed more minutely to explain the ſeveral leading points that occur in laying out the deſign for the preferable tract.

" From the Forth, about three miles up the river Carron, to a place called Carron Shore, there is at preſent a good navigation for ſea-veſſels drawing from nine to ten feet water at ſpring-tides, and from ſeven to eight feet water at neap-tides; which, from the cuts propoſed to be made acroſs the loops, as I am informed, is likely to be improved: and

ſo

ſo far I conſider the preſent ſea-navigation to extend. From Carron Shore to Top-hill, a little below Camelon-bridge, the ground is gently riſing, and accommodated as well as poſſible for a canal. From thence to the point above Camelon, between New-hall and Glenfour, the ground riſes near ſixty feet in half a mile, and is more uneven, but yet attended with no conſiderable difficulty. From thence the canal may be managed, upon the decline of the high ground, ſo as to run upon a dead level to Caſtle Cary-bridge; being four Engliſh miles. This tract of ground is interſected with haughs and burns, which occur very frequently, and will therefore require a conſiderable expence in making banks, aqueducts, and other extra works; yet nothing occurs but what may be conquered at a reaſonable charge. The principal ſingle work will be an aqueduct-bridge in croſſing Bonnie Mill Burn, near Bonnie-bridge, over which the canal muſt be carried by arches. Another, but leſſer, work of the ſame kind will be required in croſſing the river Bonnie, at Caſtle Cary-bridge. From hence, by the bog of Dolater, which begins a little above Wineford, the paſſage is ſufficiently eaſy, by a gentle aſcent; and through the ſaid bog (extending almoſt to Craigmarline woods) there is ſcarcely four feet deſcent, either way, in the compaſs of two miles, about the middle of which is the ſummit between the two ſeas, which is elevated above high water neap-tides at Carron ſhore, about one hundred and forty-ſeven feet; being diſtant from it about nine Engliſh miles. On each ſide of Dolater-bog the country riſes high, which affords a number of ſprings and rills, that bring down conſiderable quantities of water on the leaſt rain; but the principal, which is conſtant all the year, is the burn of Auchinclough, which diſcharges itſelf into the bog, and which, though it now runs into the water of Bonnie, might with very little trouble be turned ſo as to run the other way into the Kelvin; for a drain that now paſſes length-ways through the bog has, for half a mile in the middle of it, no ſenſible run at all; ſo that the ſame trench is the head both of the Bonnie and Kelvin. This bog, as it is called, is properly a peat moſs, or moraſs, and is in general near half a mile broad, but contracted at each end to about one hundred

and twenty yards; ſo that it is adapted, as well as poſſible, for the formation of reſervoirs, canals, and paſſages for water: indeed the whole bog might be eaſily put under water, by a ſmall dam between the high grounds at each of the contracted places.

From the ſummit, or point of partition, weſtward, the Kelvin runs in an open valley, for about thirteen miles, upon a very regular, and almoſt inſenſible decline, as far as Garſcud-bridge, where it begins to be very rapid, and runs through a very deep channel, quite confined by rocks and precipices, in ſome places almoſt perpendicular, down to Partick, where it falls into the Clyde. Of this diſtrict all that can be ſaid is, that it is not impoſſible to be made navigable; but it would coſt a great ſum to make a bad navigation; for this reaſon, thoſe who have turned their thoughts towards this project have ſought out a new paſſage into the Clyde; and nature has kindly furniſhed two practicable ones; one by the valley of the Allander, leaving Douglaſtoun, Kilmardony, and New Kirk-Patrick, all on the right, and cutting through a riſing ground between the two laſt places, into a valley leading down to Graſcaldon. The other paſſage leads out of the Kelvin's valley, juſt above Garſcud-bridge, and, going by way of Canny's-burn, traverſes a riſing ground, and falls into St. German's loch, and from thence, by the ſame valley as the former, to Graſcaddon. Neither of theſe paſſages is without difficulty, on account of the riſing ground to be cut through being above thirty feet perpendicular above the general level; yet both are greatly preferable to the paſſage by the Kelvin, below Garſcud-bridge, which, beſides the difficulties already mentioned, is filled with mills of various kinds, that occupy the ground where any cuts might conveniently be made. At Graſs-gadden the ground falls conſiderably in a little ſpace, and then the paſſage is very eaſy and regular down to Yocker-burn, which diſcharges itſelf into the Clyde, almoſt oppoſite Benfield, and a little above a place called Barn's of Clyde. From hence, downwards, the Clyde is navigable at all tides with any veſſels that can be expected to navigate upon the intended canal; which veſſels I would

propoſe

propoſe to be ſuch as may be able occaſionally to go from Port Glaſgow or Greenoch to Leith.

From the point of partition of the waters in Dolater-bog to the barns of Clyde, by the courſe of the canal, the diſtance is about eighteen miles, Engliſh meaſure; ſo that the whole length will be about twenty-ſeven Engliſh miles.

I ſhall omit the deſcription of the paſſage by the way of Loch Lomond, and only notice the difference of length, riſes, falls of water, and expence, which occaſioned that I have deſcribed to be preferred to the other.

The paſſage by Loch Lomond meaſures, by the courſe of rivers, &c. from Dumbarton, through Loch Lomond to Alloa, near Stirling, by the loops of the rivers, about ſeventy-three miles; and it further appears, that, by the moſt direct paſſage that can be made, it will be at leaſt forty miles; conſequently there is a difference of thirteen miles in favour of the firſt deſcribed tract for a canal.

From what has been already obſerved, it is manifeſt that the Loch Lomond paſſage is conſiderably further about than the Carron paſſage, and that it is at leaſt equally embarraſſed with difficulties; the only point, therefore, in which competition can be ſuppoſed, muſt be on account of expence. In order to bring this matter into a narrow compaſs, I will ſuppoſe the Loch Lomond paſſage to be executed at the leaſt poſſible expence; in which caſe the diſtance, as before-mentioned, will be ſeventy-three miles: the impediments being ſuppoſed equal, the difference of expence will conſiſt in two articles, viz. the difference of length of the artificial part of the navigation, and the difference of lockage. To reduce the difference of expence ariſing from the difference of length of the artificial part to the moſt ſimple form, I will ſuppoſe, in favour of Loch Lomond paſſage, that the parts of the river to be made

navigable by means of dams, &c. require the ſame expence as the ſame length of canal; though in general this kind of work turns out more expenſive in ſuch embarraſſed ſituations.

	Miles.
The whole length of the artificial part by the Carron paſſage, is	27
The whole length of the artificial part in the Loch Lomond paſſage, is	17
Difference of length in favour of Loch Lomond artificial navigation	10

	Feet.
The perpendicular height of the ſummit of the Bog of Bollat, above the neap-tide, high water, ſurface of the Clyde at Dumbarton, by the Loch Lomond paſſage, is	222
The height of the ſummit of Dolater Bog, above high water at Carron ſhore, by the Carron paſſage, is	147
Difference of perpendicular height, in favour of the Carron paſſage	75
But this difference of perpendicular height, in point of lockage, will be double	2
Feet	150

	£.
The lockage I eſtimate at 100 l. per foot, riſe or fall: the difference being 150 feet, comes to	15,000
I eſtimate the cutting at 1,250 l. per mile, incluſive of extra banking, bridges, tunnels, towing-paths, and contingent works; therefore ten miles on the Loch Lomond paſſage extra, will come to	12,500
The difference of expence in favour of Carron	2,500

So that the Loch Lomond paſſage will coſt 2,500 l. more than the Carron paſſage, is further about by almoſt forty miles, and will be attended with an additional loſs of time in paſſing, and expence in keeping between thirty and forty locks in repair.

To give any further particulars relating to the Carron paſſage, and method of ſupplying the canal with a ſufficient quantity of water for the purpoſe of navigation, would be tedious, and, I think, unneceſſary; I ſhall therefore proceed, without mentioning the burns and haughs they had to paſs, to the number of locks, their ſituations, and general expences, which are as follows:

	No. of Locks.
From Carron ſhore to the intended level of a canal above Camelon I make to be 108 feet, which, at 4 feet each, requires	27
From thence to Caſtle Carey-bridge, the canal being upon a level, will require none; but from Caſtle Carey-bridge to Redburn there is a riſe of 16 feet, which, at 4 feet each, will take	4
From Redburn into the canal of partition, being 21 feet, at three feet each, will require	7
Number of locks from Carron ſhore to the point of partition	38
From the canal of partition to Inchbelly-bridge, the fall I eſtimate at 36 feet; this, at 3 feet each, will take	12
From thence to the Clyde there will remain 109 feet; which, at four feet each, will take	27
Number of locks from the point of partition to the Clyde	39
Number of locks in the whole	77

N. B. The above is the greateſt number that can be required; for if in completing the work it ſhould appear that the ſupply of water ſhould turn out more liberal, or a leſs number of veſſels be expected to navi-

gate than I have ſuppoſed, then ſome expence may be ſaved, by making the riſe at the locks greater in general, and without preſerving a ſtrict equality; by which means they might be made more readily to ſuit the ground. It muſt, however, be obſerved, that the higheſt lock determines the quantity of water to be uſed; for were there but one lock of eight feet in the whole number, this would occaſion as great a conſumption of water as if they were all of the ſame height, unleſs an extra ſupply could be brought to this lock to place againſt the extra quantity.

Wherever the canal is, by banking, held above ſoil, that is, above the natural ſurface of the adjacent land, it is propoſed to cut back-drains behind ſuch banks, to receive any leakage that otherwiſe might hurt the adjacent ſoil, and to conduct the ſame to ſome common water-courſe; alſo to lay tunnels under the bottom of the cut, to communicate with ſuch water-courſes acroſs the ſame as require to be preſerved, or whoſe elevations may not ſuit to be brought into the canal: alſo to make bridges in proper places over the canal, for communication between ſuch properties as ſhall be ſevered from the ſame; and to make gates upon the towing-paths between every fence, and double-gates, if required, for the diviſions between different properties, with over-falls in proper places for diſcharging the ſurplus water, and whatever elſe may appear neceſſary for preſerving the poſſeſſion of each perſon's property, as near as may be, in the ſame ſtate as it ſhall be before the execution of this project.

The breadth of the canal is propoſed to be twenty-four feet in the bottom, and the ſides to be ſloped, at a medium, in the proportion of five to three; that is, to every three feet deep, to widen five feet on each ſide, or ten feet on both ſides; to have five feet depth of water, and to be, at a medium, ſeven feet deep within ſoil, ſo that its mean width at the ſurface of the water will be forty feet eight inches; and to be made wider at convenient places, at proper diſtances, for veſſels to paſs each other.

It

It is intended to make the canal leſs; for boats of ſeventeen feet and a half wide, drawing four feet water, would make them draw hard, and to make it larger would induce an unneceſſary expence. The locks I would propoſe not to exceed four feet riſe each, in order to ſave water in the working them; as if made with leſſer riſes they would be too troubleſome, on account of the number; only between Redburn and Inchbelly-bridge, as water may be there more ſcarce, I have propoſed they ſhould there have them of three feet riſe each.

I come now to conſider the expence of making the canal.

	£.
The canal being 24 feet mean width in the bottom, and 7 feet mean depth, with ſlopes as 5 to 3, the width at top will be 48 feet, and the mean width being 36 feet, will contain 28 cubic yards in each yard running, and in a mile 49,280 cube yards digging, which, at three-pence per yard, comes to 616 l. per mile, and for 27 miles in length, to ——	16,632
Extra digging in the canal of partition, to make it 50 feet at bottom, 53,308 yards, at three-pence per yard, will come to —— — — —	667
Extra work in making paſſing-places, and ſome additional meaſure by turning the angles, we may allow upon the whole the value of one mile —— — —	616
The canal being 48 feet at top, allow the ſame width for the banks on each ſide, that is 48 yards in breadth over, all which makes in one mile 84,480 ſquare yards, which is 15½ Scotch acres nearly; and for 27 miles 418½ acres, which, ſuppoſing them to be purchaſed, at a medium, at 20 l. per acre, come to —— —— ——	8,370
Beſides what is immediately occupied by the canal and its banks, lands will be wanted for conveniencies, trenches, reſervoirs, &c. which in the whole may amount to 20 acres	400
Carried forward	26,685

	£.
Brought forward	26,685
The locks, being 77 in number, at 400 l. each, will come to	30,800
To extra-digging in paſſing a narrow gripe between two riſing grounds, a little to the ſouth-weſtward of Mungul's houſe	100
To extra-digging through the ſummit of the ground between Glenforn and Newhall, above Camelon	100
To extra-banking acroſs ſix haughs, or hollows, between that place and Bonnie-mill, at an average 100 l. each	600
To an aqueduct-bridge in paſſing Bonnie-mill burn, and extra-banking up to the ſame, with an over-fall for diſcharging the ſurplus water of the canal	1,000
To extra-work in paſſing Seabeg's-wood, Trannock-burn, Acre-burn, and ſome other haughs and riſings from thence to Caſtle Cary-bridge	400
To an aqueduct-bridge for paſſing the river Bonnie, near Caſtle Cary-bridge, and extra-embanking there	800
To a ſhuttle for taking in water, as occaſion may require, from Redburn, and an over-fall for diſcharging ſurplus water,	20
To two miles of trenching, in bringing Kilſyth-burn, together with Shien-burn, into the canal of partition, which at one ſhilling per yard comes to 176 l. and, allowing 74 l. for extra-cutting, with ſuch ſmall tunnels and bridges as may be wanted under and over the ſame, together with a ſhuttle and over-fall for taking in the water, and diſcharging the ſuperfluous water, will come to	250
To building a dam or wier acroſs the Kelvin, below Inchbelly-bridge, with proper ſhuttles for drawing off the water	500
To building ſuch another dam below Calder-bridge	500
To an aqueduct-bridge for croſſing the river Allander, and extra-embanking there	300
To extra-work in piercing and vaulting a paſſage through	
Carried forward	62,055

	£.
Brought forward	62,055
the high ground between Canny's-burn and St. German's-loch	1,200
To extra-work in paſſing Graſcaddon	100
To extra-work in making a jetty for defending the mouth of the canal, and clearing the paſſage into the Clyde	150
To five public road-bridges, viz. at the road from Falkirk to Carron, at Camelon, at Caſtle Cary, at Canny's-burn, and at Yocker, at 100 l. each	500
To twenty-one bridges, where the leſſer roads interſect the canal, at 75 l. each	1,575
To twenty-eight private bridges, that may be wanted for preſerving communications between the lands, making, with the public road-bridges at an average, two in a mile, at 50 l. each	1,400
To thirteen large tunnels, for communicating the leſſer brooks under the canal, at 40 l. each	520
To ſixty-eight ſmall tunnels, for preſerving water-courſes, making together, with the large ones, at an average three in mile, at 10 l. each	680
To making towing-paths, back-drains, gates, towing-bridges, &c. at 20 l. a mile	540
To bringing the water of Enrick, from a little above Randeford, into Carron	150
To bringing the burn of Ballagin, with ſome ſprings riſing out of the hills to the weſt of the ſpout of Ballagin, into Kelvin	100
To temporary damages to lands and mills, unforeſeen accidents, impediments, and works, engines, utenſils, and ſuperviſal	10,000
Total	78,970

In

In order to eſtimate the amount of the tonnage, by which the expence is to be reimburſed, I examined the gaboats which ply upon the Clyde, and are capable of navigating that frith in all common ſeaſons, and which I apprehend, by the ſame rule, would navigate the frith of Forth between the canal and the port of Leith, if required. I found that a middling gaboat, of 56 feet long between ſtem and ſtern, 17½ wide, and drawing four feet water, will carry at leaſt 40 tons; and this I look upon to be the largeſt ſize that will be convenient for an artificial navigation. Now ſuppoſe twenty of theſe boats paſs in a day at an average, in the drieſt ſeaſons, that is ten each way, and ſuppoſing them to go full loaded from the Clyde to the Forth, and half loaded from the Forth to the Clyde, they will carry 600 tons of goods per day, and 4,200 tons per week, in which I reckon ſeven days; for though the boats ſhould not work on Sundays, yet as the water will be amaſſing, the capacity of carriage, in point of water, will not be diminiſhed; which will alſo be the caſe though they do not go regularly. But caſting off the 200 tons for accidents and diſappointments, and reckoning 4,000 tons per week, the total will amount to 208,000 tons per year, excluſive of what may further be done when the ſupply of water is unlimited. The lock-duty, excluſive of freight, would, I apprehend, very well bear five ſhillings per ton; but at two ſhillings and ſix-pence, 208,000 tons would amount to 26,000 l. per annum. From hence I would infer, that if we could furniſh water in dry ſeaſons for twenty boats per day, there will be water enough, at the loweſt tonnage that can be ſuppoſed, to raiſe a much greater annual ſum than can be wanting for repairs, and to diſcharge the intereſt of the capital to be expended, and, in all probability, more water than the trade can poſſibly want. But I would not have it inferred from hence, that, becauſe the canal can carry 208,000 tons per year, there will be 208,000 tons per year to carry: the price of tonnage therefore muſt be fixed according to the probability of carriage, which I leave to the deciſion of thoſe who are better ſkilled both in the general trade of this kingdom, and the particular trade of theſe parts, than I am.

On

On further conſidering the ſubject of the foregoing report, Mr. Smeaton is of opinion it will be eligible to carry Redburn into the canal of partition, not as a ſubſidiary expedient in caſe of need, but to be applied in the firſt conſtruction, the charge of which will be amply recompenſed by the omiſſion of five locks between Redburn and Inchbelly-bridge; for the three-feet locks propoſed in that diſtrict may then be four feet, the ſame as all the reſt: and it will appear, by what has been ſaid before, that the water expended on the whole will be preciſely the ſame; ſo that then the number of locks will be thirty-ſix each way, and in the whole ſeventy-two.

Mr. Smeaton has contraſted the canal of Languedoc with that of the rivers Forth and Clyde, in the following manner:

As the nobleſt work of the kind that ever has been executed, I mean the royal canal of Languedoc, has been generally eſteemed not to anſwer the expence, this will undoubtedly be made an argument againſt the preſent propoſition; I ſhall therefore oppoſe ſome matters of fact relating to the French canal, by way of parallel.

Canal of Languedoc..	Canal of Forth and Clyde.
Length of the canal between Port de Cette, on the Mediterranean, and Thouloufe is 152 Engliſh miles, beſides a river-navigation from Thouloufe to Bourdeaux, which is above 100 miles more; ſo that the whole length of inland navigation is above 250 Engliſh miles between the ſea-ports.	Length of the canal between Carron-ſhore and the Barns of Clyde is 27 Engliſh miles. Sea-veſſels go up to the Carron-ſhore and to Dumbarton, the diſtance of which, by the canal, will be 33 miles; but reckoning from Port Glaſgow to Leith, the diſtance will not exceed 70 Engliſh miles.

Suppoſe the veſſels make way, at an average, 1½ mile per hour, the paſſage will take fourteen days, of twelve hours each.

The perpendicular height of the point of partition is 639 feet Engliſh above the two ſeas.

This canal is navigated by one hundred locks, of above 8 feet riſe each.

The expence of this undertaking has been 612,500 l. ſterling.

This work is ſtill incomplete, by reaſon of the ſhoals in the river Garonne, below Thouloufe, which in dry ſeaſons greatly interrupt the veſſels; to carry the canal below which, as the only remedy, it is eſtimated will coſt 43,750 l.

Suppoſe the veſſels to make way, at an average, 1½ mile per hour, the paſſage will be but four days, of twelve hours each.

The perpendicular height of the point of partition in the propoſed canal is 145 feet.

This canal is to be navigated by ſeventy-ſeven locks, of between 3 and 4 feet riſe each.

The expence of this undertaking is eſtimated at 78,970 l. ſterling.

This canal falls into the rivers Carron and Clyde, in the tides-way, at places where there will be no obſtruction to the veſſels propoſed to navigate the canal in the drieſt ſeaſons at high-water, and whence they may proceed on their voyage to their reſpective ſea-ports.

Now if it may be admitted that as great a trade is likely to be carried on between the Forth and Clyde, where the ſea-navigation is long and dangerous, and the inland ſhort and eaſy, as between the Gulf of Lyons and the Bay of Biſcay, where the ſea-navigation is open at all times, though long, and the inland navigation tedious, and ſometimes

almoſt impaſſable for want of water over the ſhoals in the river; the inference is plain, viz. that the ſame tolls which will hardly keep the French canal in repair, will make this a very beneficial undertaking to the Britiſh adventurers.

In the former part of this work I mentioned a writer who was an advocate for a river-navigation between the rivers Forth and Clyde, notwithſtanding every argument from theory, and proof from practice, of its diſadvantages; and as I there promiſed to give ſome account of what has been ſaid in its favour, I cannot do it in a more proper place than here, as the publication in queſtion particularly relates to the navigation betwixt the Forth and the Clyde, and frequently mentions Mr. Smeaton's report, from which ſeveral extracts have juſt been given. As the pamphlet is a work of conſiderable merit and acute reaſoning, I preſume I ſhall be excuſed for departing from my firſt reſolution, which was not to take any notice of river-navigation.

This pamphlet is intitled, "Reflections on Inland Navigations, and a new Method propoſed for executing the intended Navigation betwixt the Forth and the Clyde in a complete Manner, and at an Expence one-third leſs than what that Work has hitherto been eſtimated at." It is addreſſed to the noblemen and gentlemen ſubſcribers for forming a navigable canal to join the Forth and Clyde, at whoſe deſire it was compoſed by J. Gray, 1768.

"It muſt give," ſays this writer, "a ſingular pleaſure to every well-wiſher to Great-Britain, to ſee ſo much attention at preſent beſtowed upon the forming of navigable canals in different parts of this iſland, particularly in regard to that for opening a communication for ſea-veſſels between the Forth and the Clyde, which, though not the moſt difficult in point of execution, is by far the moſt national and moſt important. This, as it is now propoſed to be executed by the ſubſcribers, will not partially regard a ſingle town, or extend its influence to one or two

counties only, but will be a thoroughfare for the eaſt and weſt coaſts of the whole iſland, nay even for different nations, for it will in a manner bring Ireland and America on the one hand, and Germany and the nations of the Baltic on the other, reciprocally three hundred miles nearer each other. Foreigners will therefore doubtleſs be ſurpriſed to find this an attempt of private undertakers, when the very nature of it renders it a national object of the firſt importance. Such, I make no doubt, it will appear to our legiſlature; and that, if private funds ſhould fail, or prove inſufficient, we may expect to ſee it carried on and completed at the public expence with the general approbation. What therefore, I think, ought chiefly to be attended to at preſent, is the manner of doing it well, and to the beſt advantage, without a ſtrict limitation as to the expence. But though no certain ſum ſhould be fixed upon for the finiſhing the undertaking, it is nevertheleſs extremely proper to examine how the leaſt expence may be incurred in executing the work in the completeſt manner.

" Mr. Smeaton has, with much ſolidity and diſcernment, given a diſtinct and accurate detail of the requiſites for completing a navigation, upon the ſuppoſition of digging an artificial canal from ſea to ſea; and if that plan ſhould be adopted, I am perſuaded that the real expence would be found to differ extremely little from his eſtimate. I propoſe, however, to offer another method, which appears to me much more natural, much more ſimple, to be founded on the plaineſt principles of hydroſtatics, and which would anſwer every purpoſe of the ſubſcribers, in affording an eaſy and ſafe navigation of ſea-veſſels from frith to frith, though it would coſt conſiderably leſs than the plan hitherto propoſed.

" When water is confined on every ſide, it naturally places itſelf upon a level, but if any one part of the confining bank be made lower than the ſurface, the water will immediately deſcend by that breach till it meets with ſome other obſtacle; for its gravitation makes it always ſeek to approach

proach the centre of the earth, and its fluidity gives it an eaſy opportunity of eſcaping; for a declivity in one part affects the whole ſurface. Let us ſuppoſe a quantity of water, of an equal depth, contained in an oblong veſſel, with two ſides and two ends, the ſides and ends will have an equal preſſure upon them; and were the length and breadth to be augmented never ſo much, yet, if the depth be not augmented, the preſſure upon the ſides and ends is no more in the greater ſurface than in the ſmaller; for it is an eſtabliſhed principle, that water does not preſs againſt its banks according to its ſurface, but according to its perpendicular height or depth. A canal or river made navigable by art, is nothing elſe between lock and lock than this oblong veſſel; and the ſame banks that will contain a ſmall mill-ſtream ten feet broad, will ſuffice to contain a canal a hundred feet broad, if the depth in both be equal: and ſhould an overflowing happen, it is altogether indifferent whether the ſuperabundance of water eſcape by the ſides or by the end; nay, by the conſtruction which I ſhall propoſe, its eſcaping by the end is attended with particular advantages. I think, therefore, that in numberleſs caſes it may be deemed labour thrown away to carry canals along the ſides of rivers at a great expence of digging, extra-banking, aqueduct-bridges, tunnels, ſluices, &c. when often at a leſs expence, and to a much better effect, the rivers themſelves might be made navigable, without the leaſt cauſe of apprehenſion of any exceſs of water; as in the very conſtruction of the canal the danger of an overflowing may be provided againſt. The great rapidity and violence of rivers, during a flood, has no doubt been the reaſon that deterred the conſtructors of canals from riſking any communication with them. But though a body of water running down a declivity be a furious giant, overturning every thing before him; yet if this ſaid giant be laid flat upon his back, he loſes all his force, and becomes entirely paſſive, whatever be his ſize. If they had reflected on this principle, they might have eaſily ſeen that they had it in their power, by banks and dams of a particular conſtruction, to bring almoſt every river, requiring art to render it navigable, to this paſſive ſtate; I ſay almoſt every river, becauſe direct ca-

taracts

taracts and perpendicular waterfalls muſt be excepted. Some other rivers alſo, conſiſting of a large body of water running down a ſteep deſcent, ought to be neglected; becauſe it could hardly be expected that the profit ariſing from the navigation could repay the expence of making it.

" But that is far from being the caſe of the two ſmall rivulets that have their courſe in the tract of the intended navigation. They are both very inconſiderable, are almoſt dry in ſummer, and run very gently into the different ſeas, excepting in one place, where one has a cataract, which may be eaſily avoided. The reader who has not an opportunity of viewing the tract upon the ſpot, may imagine to himſelf a narrow valley, running tranſverſely for thirty miles from ſea to ſea, and bounded on the ſouth and north by high and mountainous ground. The middle of this valley is almoſt a dead level for ten miles, and two ſmall brooks that riſe there form a ſtraight line, by running in oppoſite directions into different ſeas. The current of thoſe brooks is extremely gentle; for the place where they take their riſe has been found by meaſurement not to exceed a hundred and forty-ſeven feet above the level of the ſea.

" From this account it plainly appears that the queſtion ought not to be about digging an artificial canal, but about banking in two ſmall brooks. So far from being afraid of thoſe two rivulets, I actually conſider them as nothing, but regard their channel as the moſt proper bed and declivity for the canal; a declivity pointed out by nature, which may eaſily be reduced to ſo many levels by dams and locks, and which may be banked on both ſides, at what breadth we pleaſe, without having any extra-digging or extra-banking in their whole courſe, but, on the contrary, offering us great part of the work already done to our hands. Theſe rivulets, in their courſe, keep always in the lowermoſt part of the valley; and, in carrying a canal through this valley, is it not moſt natural to take the holloweſt part for the courſe of the canal, rather than carry it over waving and uneven ground, which by being too high in ſome

parts

parts occaſions extraordinary digging, and, by being too low in others, requires extraordinary banking? By chooſing the courſe of the rivulets for the tract of the canal, ſluices, tunnels, and aqueduct-bridges are alſo all ſuperſeded and rendered unneceſſary; for, inſtead of turning aſide little rivulets or occaſional ſtreams, the canal would be the common receptacle of all of them, as it would be ſo ſituated as to receive them all, and by its conſtruction could never be incommoded by them. The following this tract would likewiſe be attended with other advantages; particularly, there would be no new diviſion and ſeparation of private property, and there would be very little occaſion for any change of property whatever, excepting the property of the rivers and their banks; for though the rivulets are inconſiderable, yet in many places there is as much land on both ſides of them waſted, as would ſuffice for ground for the canal, were it even to be a hundred feet broad; and ſurely that waſte ground cannot be highly valued by the preſent proprietors. By placing the canal in the hollow, it would alſo be eaſier to improve the ground on both ſides of it, which will no doubt ſoon change its face after the navigation is finiſhed, and become three or four times more valuable than it is at preſent. But what is the moſt material is, that this tract ſeems by nature moſt fitted for the courſe of the canal.

" As the two rivulets that run through this valley are inconſiderable in proportion to the intended ſize of the canal, and, as ſhall be afterwards ſhewn, can never be dangerous even in floods, I would propoſe that the hollow of the valley where they run ſhould be fixed upon for the courſe of the navigation; and I would form the canal, not by digging for the whole depth, but by two parallel mounds or banks, placed eighty feet aſunder the whole way, even at the locks, like two parallel turnpike-roads, and raiſed ſo high that the banking and digging put together ſhould include a depth of twelve feet. In forming the canal, by banking along the courſe of the rivulets, we ſhould have, as I ſaid above, great part of the work already done to our hands; for the rivulets in many places have formed a conſiderable channel, which they rarely occupy;

cupy; in others their ordinary ſurface is one, two, or more feet below the banks; and in others, the ground cloſe by the river naturally forms a conſiderable mound, ſo that the water might there be kept up twelve feet deep by one artificial mound only. All theſe natural advantages are ſo conſiderable, that I am perſuaded they would render the expence of forming the banks one-third leſs than it would otherwiſe be.

" Let us conſider the canal awhile as extending from ſea to ſea without locks, and the two banks ſloping in the proportion of five to three; it affords us a capacious bed twelve feet deep, forty-eight feet broad at bottom, and eighty feet broad at top. This gives us a medium breadth of ſixty-four feet, which multiplied by twelve feet, the greateſt depth, gives us ſeven hundred and ſixty-eight feet for the contents of the canal. Let us now compare this with the two rivulets, both in their common ſtate and in their greateſt augmented ſtate, and we ſhall find that, even in the laſt, they would be entirely abſorbed in the canal, and would never overtop its banks. In the end of November laſt (1767), when there was a great deal of water on the ground almoſt every where, I viewed the Bonie water and the Kelvin, which were each of them in an augmented ſtate, and, as I was aſſured, near double their ordinary ſize; yet even then the Bonie water, near Bonie-bridge, was only about ten feet wide and one foot deep; and the Kelvin, at Inchbelly-bridge, was about fifteen feet broad, and a foot and half deep; which gives for the medium quantity of water little more than ſixteen feet, when the rivers were double their ordinary ſize. The quantity then flowing in their ordinary ſtate is only about eight feet, which is not the hundred and fiftieth part of what might flow in a canal of the dimenſions above-mentioned, upon the ſuppoſition of its being brimful, and the current meeting with no ſtop or obſtruction from ſea to ſea. It may however be ſaid, that though the rivers Bonie and Kelvin be really very inconſiderable in dry weather, yet there is ſeldom a winter paſſes that they are not ſwoln with land-floods, which raiſe them above their banks, and overflow the country for ſeveral hundred yards on both ſides.

ſides. But let theſe floods be narrowly examined into, and the greateſt exceſs of them computed, by conſulting the oldeſt perſons living in the neighbourhood, and I am perſuaded it will be found that they never have riſen to ſuch a degree as that they could not be contained with eaſe in the channel of the propoſed canal.

" There was this autumn a great flood in the Kelvin, which overflowed the vale in many parts, for a length of five or ſix miles, and carried off conſiderable quantities of corn, that was ſtanding in ſheaves upon the field; and ſo great a flood, I believe, has not happened for very many years paſt; yet I have been aſſured that, by marks upon ſome trees and ſhrubs near Inchbelly-bridge, it appeared this great flood had not riſen more than ſix feet above the uſual level of the river. Its ſpreading wide over the vale, was only a proof of the levelneſs of the vale, and was owing to its not being confined; for, excluſive of perhaps thirty or forty feet in the middle, where lay the thread of the ſtream, all that great breadth was dead water, which, if the river had been hindered from extending itſelf, would have been carried off, in proportion as the flood roſe, by the increaſed velocity of the ſtream, without augmenting its extraordinary depth perhaps above ſix inches. This great flood, then, when narrowly examined, and ſuppoſed to be confined all the way between two hills forty feet aſunder, would probably have turned out to be a ſtream not ſeven feet deep. But the capacity of the canal I have propoſed, which is twelve by ſixty-four, is large enough to let a ſtream four times as great as that paſs eaſily through it, as is well known to thoſe who are acquainted with the motion of fluids, which increaſes as the depth increaſes; conſequently, ſuppoſing a flood twice or thrice as great as the late great flood, the canal and the navigation would have nothing to fear from it.

" I enquired the height of the greateſt floods in the river Bonie, within two miles of the ſea, where it loſes its name on account of its junction

with the more conſiderable river, the Carron; and I was ſhewn by one of the overſeers of the works at Carron the marks of the greateſt flood in his remembrance, which are about ſix feet above the uſual ſurface, where the breadth was about ſixty feet. But ſuppoſing the Bonie water (or the Carron) at that time flowed nine feet deep, and ſixty feet broad, the canal I propoſe could well afford room for a flood twice as great as that. There does not therefore ſeem the leaſt grounds to think that a canal of the dimenſions above ſpecified would ever be endangered or incommoded by any flood, on the ſuppoſition of the waters having a free courſe through it. But ſhould it be found that the floods are larger than I have computed them (though the canal would allow room for floods twice as large as thoſe I have mentioned), it is only ſetting the banks a hundred feet aſunder inſtead of eighty feet, and the danger is provided againſt; and the canal becomes more magnificent without any great additional expence, as ſhall be treated of more particularly afterwards.

"As to the banks or mounds, it will be proper not to be ſparing of the expence in their firſt conſtruction, but to make them ſufficiently ſtrong, that is to ſay, ſufficiently thick, that they may almoſt appear like the work of nature, and never after need any repairs. I would adviſe that they ſhould be raiſed at an average eight feet above the ſurface of the ground, ſhould be twelve feet broad at top, and ſlope towards the canal in the proportion of five to three. In the forming of them, the very wideneſs of the canal gives us particular advantages; for four feet depth of earth over the whole bottom of the canal, together with what is dug for making the back-drains, will nearly ſupply earth for the completing of them. What is wanted may be eaſily carted from different ſpots in the neighbourhood, as is done in the making of turnpike-roads; but it will never be neceſſary to bring it from any great diſtance, like the materials for roads, becauſe proper earth may be found almoſt every where: conſequently the expence of making thoſe mounds may be pretty nearly eſtimated, from what has been paid for making the turnpike-road to Kilſyth per mile, as I reckon that both the banks together would amount

to

to about ſix times as much, deducting, however, one-third for what is already done by nature.

" Were the mounds to be conſtructed of the ſize and form above-mentioned, I am perſuaded hardly any one would doubt of their being ſufficient for the purpoſe intended by them, of confining the two rivers, and all the water that ſhould come from the point of partition or head ſource, with the other occaſional ſtreams that might fall into the channel in the courſe of the canal. But to convince the moſt incredulous, I ſhall give an inſtance of a river above a thouſand feet broad, navigable even for veſſels of war, which is confined by artificial mounds, and whoſe ſurface is above ten feet higher than the adjoining ground on both ſides.

" That river is the Thames, which in different places below London, particularly from the Iſle of Dogs to the Woolwich-marſhes, is fenced in on both ſides by artificial mounds, though it be there above fifteen hundred feet broad, and the tide, during ſix hours of the four-and-twenty, be full ten feet above the ſurface of the adjoining ground.

" Hiſtory, I believe, does not mention when theſe mounds were firſt made; but probably without them there would be two hours leſs tide at London, and the navigation up and down would be more dangerous, as veſſels might frequently be ſtranded on the ſhallow meadows: thus, though the Thames may juſtly be reckoned one of the firſt navigable rivers in Europe, it is nevertheleſs indebted in ſome degree for its navigation to art.

" What has been done at the Thames is an example before our eyes of the eaſy practicability of what I propoſe for the preſent navigation. But beſides the Thames, there are numbers of other rivers, and artificial canals carried above ſoil, without any inconvenience from ſoakage or leakage, or any danger to the banks themſelves, which by their own weight, and the moiſture of the river, ſoon conſolidate into one maſs.

How many mill-ſtreams might be particulariſed that are banked on one ſide? The river St. John, in Nova Scotia, is banked on both ſides, like the Thames, for a great number of miles. The New River is conducted to London in many places above ſoil. The duke of Bridgewater's canal is not only ſupported in many places by an artificial bank, but the bottom of the canal itſelf is mounted above the natural ſurface between thirty and forty feet, and is carried over an artificial mound of earth of that height for ſeveral miles together. To conclude, the canal propoſed by Mr. Smeaton in both his reports, is intended to be banked in ſeveral places, particularly in a hollow, weſt from Camelon, eighteen feet deep, and two hundred and ten feet wide at top, where the very bottom of the canal for a conſiderable way will run about eight feet above the natural ſurface.

"I have hitherto conſidered the canal as without locks; but having explained the form and ſize of the mounds or banks, and given, I think, inconteſtable proofs that they would effectually anſwer all the purpoſes expected from them, of keeping up the water on the ſides without leakage, I ſhall now proceed to a particular deſcription of the lock that is intended to keep it up at the end, or tranſverſely.

"I propoſe that the breadth of the canal ſhould be divided into three ſpaces, by two ſtone piers of aſhlar work, ten feet thick and eighty feet long, built parallel to each other, at the diſtance of twenty or twenty-four feet, like the piers of a bridge. The ſpace between theſe two piers forms the lock, by being built up at the upper end ſix feet high, and having flood-gates at both ends. I propoſe the fall of the lock to be only ſix feet, becauſe that added to the depth of water, which may be eleven or twelve feet, will require the lower gates to be eighteen feet high, which is a ſize ſufficiently large for the convenience of working; and the tops of the piers may be built flat, with a ſmall parapet and a capſtan (campſhot is meant) at each end, for the men to walk upon them to work thoſe gates. If the breadth of the lock be twenty-four feet, the

two

two outward ſpaces, from the piers to the banks on each ſide, will be eighteen feet wide each; and it is propoſed to ſhut up thoſe places by flood-gates, twelve or thirteen feet high, made to open occaſionally, and likewiſe to have ſliding-vanes or ſluices. Suppoſing the flood-gates of all the three ſpaces ſhut, and that there is no want of water at the point of partition or upper ſource, where the chief of the ſupplies will be collected, it is plain that the canal will quickly be filled to the top of thoſe gates and the top of the banks; and, if the water continues to run, it will ſoon flow over them: but to prevent that, the ſluices of the gates, or the gates themſelves may, by thoſe who reſide at the locks, be eaſily kept open, in the proportion neceſſary to give a free paſſage to all the ſuperabundant water, without diminiſhing in the leaſt the quantity once collected in the canal; by which means, what the poet metaphorically ſays of the Thames would be literally true in regard to the canal; *Tho' never overflowing, it would be always full.*

"Let us examine the ſupplies of water at the point of partition, or head reſervoir, to ſee if we can draw any more uſe from them than that of filling the canal, and furniſhing water for the navigation. On the ſuppoſition that the extent of the navigation on the canal will require annually, as by Mr. Smeaton's ſecond report, $5{,}333\frac{1}{3}$ locks full of water, that by the lock I have propoſed will amount to 61,439,616 cubic feet per year, or 168,328 cubic feet per day. As the canal of eighty feet broad has three flood-gates at each lock inſtead of one, I ſhall ſuppoſe that the leakage per day is three times as much as it is ſtated by Mr. Smeaton, or twelve locks full, which is 138,240 cubic feet. Reckoning the exhalations in the ſame proportion as Mr. Smeaton, or at one-tenth of an inch per day (though that be a large allowance), the daily expence in that article in a canal thirty-ſeven miles long, and ſeventy-five feet broad at the water-line, will be 122,100 cubic feet. As the banks I propoſe may juſtly be reckoned as tight as the natural earth, the ſoakage cannot be ſuppoſed more here than in the other canal, unleſs

leſs upon account of the augmented depth; we ſhall therefore ſtate it at 110,000 cubic feet per day, and the total expence of water per day will ſtand thus:

	Cubic Feet.
Water expended by lockage per day	168,328
leakage per day	138,240
exhalations -	122,100
ſoakage -	110,000
Total of water expended per day	538,668

"To ſupply this daily conſumption, there are ſix ſmall ſtreams or burns that may be made to run and empty themſelves in the head reſervoir at the bog of Dolater; from whence the canal may be amply furniſhed with water to both extremities. Theſe burns or ſtreams are computed by Mr. Smeaton to furniſh, during ſeven months of the year, 1,842,043 cubic feet per day; for three other months to ſupply 669,678 cubic feet per day, and in great droughts, during two months, to yield only 254,328 cubic feet per day; conſequently though for near two-thirds of the year there would be a great deal more water than is wanted for the navigation, yet during two months it would ſeem that there ſhould be a conſiderable deficiency.

"But that all deficiencies may moſt certainly and amply be ſupplied, ſo as at all times to afford a great redundancy of water, if deſired, will appear moſt plainly from the following further remarks of Mr. Smeaton: The bog of Dolater, he ſays, to the extent of 200 Engliſh acres, may by dams at each end be laid ſix feet under water, and deducting one foot depth for exhalations, there would ſtill remain 43,560,000 cubic feet of water, which would ſupply the deficiency occaſioned by the drought for 158 days, or five months. Beſides, at Townhead lint-mill, about a mile north of the point of partition, and conſiderably above the level of that,

that, a valley or hollow may, by a dam not fifty yards long, be laid under water four or five fathoms deep, ſo as to form a reſervoir equal in capacity to that of Dolater. On the ſouth ſide of the canal the waters of Biſhop's-loch, and of four others in the neighbourhood, forming altogether a ſurface of between three and four hundred acres, may be pent up from four to ſix feet higher than at preſent, and brought to Dolater-bog. Beſides theſe three reſervoirs, each of which may contain about 43,000,000 of cubic feet of water, he mentions ſeveral other rivulets that might be brought to account. He concludes, " That were ten times as much " water neceſſary for the canal as what appears to be ſo, there is the " evident means of bringing it, and amaſſing it without putting any " ſtrain upon nature.

" Since then it is ſo eaſy and practicable to have an ample ſupply of water at the point of partition, I would propoſe that proviſion ſhould be made not only for the daily conſumption before-mentioned of 538,668 cubic feet of water, but alſo for as much more as ſhould be ſufficient for turning a mill at the firſt lock, at each end at the point of partition or head reſervoir. The fall of the lock will ſerve for the fall of the mill; and ſuppoſing a mill at every other lock on each hand all the way downwards, the ſame water that turned the uppermoſt mills would ſerve to turn all the reſt; ſo that if there be fifty locks upon the canal, there may likewiſe be conſtructed fifty water-mills, if wanted, without any prejudice to the navigation. The millers of thoſe mills would be the natural keepers of the locks; and as they would always be upon the ſpot, every land-flood could eaſily be regulated by them, ſo as to be imperceptible in the canal. Some great floods indeed muſt be excepted; but ſuch as theſe do not happen every winter, and when they do happen, ſeldom continue above ſix or ſeven days; during which time the navigation of the canal would be rendered more difficult. This week's loſs, however, may be ſet againſt the ſame time that would probably be loſt every winter in the artificial canal by froſt, and the account ſtand balanced; for, in froſty winters, it may well be preſumed that dead water

would

would be incommoded with ice for more than a week longer than water that has a ſmall current, and which might be made to raiſe and lower its ſurface ſome inches every two or three hours.

" When we conſider likewiſe, that the greateſt floods generally happen in the end of autumn, when the head reſervoirs are at the loweſt ebb, the rain that deſcends, and the augmented rivulets might be in a great meaſure kept collected in thoſe reſervoirs, and let gradually into the canal; by which means the impetuoſity of any flood might be greatly abated. But ſuppoſing the head reſervoirs full, even in that caſe, were all the flood-gates of the canal thrown open, there would, as has been ſhewn, be room enough for the greateſt probable flood to paſs off, without ever getting out of the bed of the canal; for, from one dam it would flow to a ſecond, and from that to a third, &c. always finding a channel more capacious than was required.

" The locks and dams which I propoſe, conſiſting of two piers and three flood-gates, beſides rendering the navigation of the rivulets practicable and eaſy, and giving the profit of the mills, might alſo ſerve as bridges, by laying beams from one pier to the other, and from each pier to the adjoining bank; but it muſt be remembered, that the part between the two middle piers muſt be made a draw-bridge, to be lifted up at the paſſing of each veſſel. It is propoſed in general, that every dam ſhould ſerve the triple purpoſe of being a bridge, of lifting the water for the uſe of the navigation, and of containing it for the uſe of the millers."

The above extracts appear ſufficient to explain the plan, and ſtate the principal arguments of this writer; thoſe who wiſh for a more full account, may conſult the pamphlet itſelf *. I ſhall however ſubjoin, from the ſame publication, an eſtimate of the probable expence of completing the canal according to the plan there propoſed.

* Printed for T. Cadell, in the Strand, 1768.

" The length of the canal will be about 37 miles from the mouth of the Carron to below Dunbuck-ford, on the river Clyde, with a ſide-branch to Glaſgow, as in the charts already printed; and its breadth, from the outſide of one back-drain to the outſide of another, 129 feet, or 43 yards, conſequently it will occupy in the whole 452 Scotch acres; but it muſt be remembered, that great part of this tract is waſte ground on both ſides of the rivulets, and, inſtead of being of any profit to the owners, often brings damage to them; conſequently the parting with it would render what remains of more value to them.

	£.
The real ground to be valued for the canal would therefore probably not exceed 300 acres, which, at 20 l. per acre, is	6,000
Suppoſing 100 acres more allowed for reſervoirs, that, at 20 l. per acre, comes to — — —	2,000
In the length of the canal there will be about four miles required to be dug wholly within ſoil; namely, two miles at the point of partition, and one mile at each end next the ſea; this makes about 600,737 cubic yards of digging, which, at three-pence per cubic yard, is — — —	7,509
I propoſe the banks, at an average, eight feet above ſoil, twelve feet broad at top, and ſloping toward the canal in the proportion of five to three, which will give, for a medium thickneſs, 18½ feet; both the banks together being reckoned 68 miles long, the cubic yards contained in them will amount to 1,968,071, which, at three-pence per cubic yard, is 24,600 l. But of this ſum, as I have before obſerved, one-third ought to be deducted for what is already done by nature, conſequently there will remain for the expence of banking — — — —	16,400
To fifty locks, at 1000 l. each — —	50,000
Two abutments on the banks at each lock, in all a hundred	10,000
For the dams at the ends of the bog of Dolater, as by Mr. Smeaton's eſtimate — — —	2,277
	94,186

	£.
Brought forward	94,186
To extra expences on the Alander paſſage, by ſame eſtimate — — — —	13,754
To extra expences in carrying the canal to Glaſgow over the river Kelvin, by Mr. Smeaton's eſtimate —	5,333
For conducting ſtreams to the reſervoir, by ſame eſtimate	500
For 100 ſmall bridges of one arch, 10 feet ſpace each	3,000
For building 80 mills — — —	5,000
For advancing the canal from Dalmuir Burnfoot to below Dunbuck-ford, as by Mr. Smeaton's eſtimate —	18,000
For unforeſeen accidents — ———	20,000
£.	159,773

" I have already mentioned, that were the canal to be 100 feet broad, inſtead of 80 feet, the additional expence would not be very conſiderable, provided the method of banking be purſued; for it is plain the ſame banks that would contain the water in a canal 80 feet broad, would alſo contain the water in a canal 100 or 300 feet broad, conſequently the additional charge would be chiefly upon the purchaſe of the land, and the conſtruction of the locks; the canal of 100 feet broad exceeding the former by 20 feet, would conſequently occupy in a length of thirty-ſeven miles 71 acres more than the other, which at 20 l. an acre would be 1,420 l. The locks and dams in this canal might be built with four piers inſtead of two, which would probably enhance the expence about 20,000 l. and ſuppoſing the two middle piers to ſtand as before, at 24 feet diſtance, the two outward piers may be placed ſo as to leave two ſpaces, 16 feet broad each, betwixt them and the middle piers; one of which ſpaces may be formed into a ſmall lock for ſmall veſſels. Allowing 20,000 l. more extra expences, the whole additional charge incurred in forming the canal 100 feet broad by banking, would be 41,420 l.

" By purſuing the method of banking, I venture to aver that a canal 15 feet deep, and 300 feet broad, excepting at the locks, might here be made from ſea to ſea for the expence of Mr. Smeaton's higheſt eſtimate, or 293,444 l. which he computes a canal will coſt 69 feet broad and 12 feet deep, dug all under ſoil. Every reader may recollect what great quantities he has ſeen collected in gather-dams, or mill-ponds, by banks above their ſurface; and I appeal to any artiſt, who ſhall view this vale, whether it is not very eaſy to form a ſtring or chain of gather-dams from ſea to ſea, affording a depth and breadth of water ſufficient for the navigation of veſſels of one or two hundred tons. Some canals in this iſland are juſtly matter of wonder, on account of the curious artifices uſed in their conſtruction; but I could wiſh the whole wonder of this canal ſhould be its ſimplicity, joined to an air of magnificence."

So far my author, whoſe merits or demerits I leave to the judgment of the diſcerning reader; to add my own opinion would be ſuperfluous. I ſhall therefore proceed, as I have done before, to give a ſhort extract from the act obtained to carry this moſt uſeful canal into execution, and conclude with the beſt account I have been able to procure in what manner it was completed.

This act (1768) is intitled, An Act for making and maintaining a navigable Cut or Canal from the Frith, or River of Forth, at or near the Mouth of the River Carron, in the County of Stirling, to the Frith or River of Clyde, at or near a Place called Dalmuir Burnfoot, in the county of Dumbarton; and alſo a collateral Cut from the ſame to the City of Glaſgow: and for making a navigable Cut or Canal of Communication from the Port or Harbour of Borrowſtouneſs, to join the ſaid Canal at or near the Place where it will fall into the Frith of Forth.

The preamble ſets forth, That whereas the making a navigable cut or canal from the Frith, or river of Forth, at or near the mouth of the river Carron, in the county of Stirling, to the Firth or river of Clyde,

at or near a place called Dalmuir Burnfoot, in the county of Dumbarton, through the counties of Stirling, Lanerk, Renfrew, and Dumbarton, with a collateral cut or canal to the city of Glaſgow, will open an eaſy communication between the firths of Forth and Clyde, as alſo between the interior parts of the country, which will not only be a great advantage to the trade carried on between the ſaid two firths, but will alſo tend to the improvement of the adjacent lands, the relief of the poor, and the preſervation of the public roads, and moreover be of general utility; be it enacted, &c. &c. Then follow the names of the truſtees and proprietors. And the ſaid company of proprietors, their ſucceſſors and aſſigns, ſhall be, and are hereby authoriſed and impowered, from and after the paſſing of this act, by themſelves, their deputies, agents, officers, workmen, ſervants, and aſſigns, to make and complete a cut or canal of ſeven feet depth of water, navigable and paſſable for boats, barges, and other veſſels, from the firth or river of Forth, at or near the mouth of the river Carron, paſſing on the north ſide of the houſe and offices of Kerſe, through or near Bainsford, to or near Bonny-mill, to or near Bankier-mill, in the county of Stirling; to and through Dolater-bog, to or near Inchbelly-bridge, to or near Calder-bridge, paſſing between Killmardinny-hill and Beauclair; to or near St. Germain's-loch, and betwixt Clobey-hill and the hill of Bladardy, to or near three-part mill-dam, and to the firth or river of Clyde, at or near a place called Dalmuir Burnfoot, and the ſaid collateral cut of ſeven feet depth of water from the ſaid main canal, at or near a place called Bladardy, through or near Partick, acroſs the river Kelvin to the city of Glaſgow aforeſaid; and to ſupply the ſaid cut or canal, and collateral cut, whilſt the ſame ſhall be making, and when made, with water; and alſo to make proviſion for replacing the water which ſhall be taken by them from the rivers Carron and Kelvin for the uſe of the ſaid intended navigation, from ſuch ſprings as ſhall be found in making the ſaid cut or canal and collateral cut; and from any part of the river Enrick, and the ſources thereof; and from all rivers, ſtreams, lakes, or locks, within the diſtance of ten miles from any part of the ſaid main cut or canal, as well as for making proviſion

viſion for replacing the water which ſhall be taken by them from the rivers of Carron and Kelvin as aforeſaid; and alſo to make ſuch reſervoirs, within the diſtance laſt-mentioned, as ſhall be neceſſary for the purpoſes of the ſaid intended navigation, for the more conveniently ſupplying the ſame with water, &c. Provided always, and be it enacted, that the land or ground to be taken or uſed for ſuch cut or canal, and collateral cut and towing-paths, and the ditches, drains, and fences, for ſeparating ſuch towing-paths from the adjoining lands, ſhall not exceed one hundred yards in breadth, except in ſuch places where the ſaid cut or canal, and collateral cut, ſhall reſpectively be raiſed higher, or cut above eight feet deeper than the preſent ſurface of the land, and in ſuch places where it ſhall be judged neceſſary for boats or other veſſels to turn, lie, or paſs each other in any of the ſaid reſpective places: nor ſhall any land or ground be ſet out, aſcertained, contracted for, and ſold, for the purpoſes of making any navigable cut, trench, or ſluice, to convey goods, commodities, or other things to or from the ſaid cut or canal, or collateral cut, without the conſent of the owner or owners of the ſaid lands reſpectively, under his or their hands in writing firſt had and obtained, &c. Proprietors may raiſe money among themſelves to carry on the work, not to exceed one hundred and fifty thouſand pounds ſterling, to be divided into ſhares, not exceeding one hundred pounds, ſterling money, to each ſhare; and if that ſum is not ſufficient, a farther ſum may be raiſed, not exceeding the ſum of fifty thouſand pounds ſterling. Subſcribers to have a vote for every five ſhares, by themſelves or proxies; but no proprietor to have more than ten votes, even if poſſeſſed of more than one hundred ſhares. The tolls allowed to be taken are as follow: For tonnage and wharfage for all iron, coal, ſtones, timber, and other goods, wares, merchandiſes, and commodities whatſoever, which ſhall be navigated, carried, and conveyed upon or through the ſaid cut or canal, or collateral cut, ſuch rates and duties ſhall be taken as the ſaid company of proprietors, their ſucceſſors and aſſigns ſhall think fit, not exceeding the ſum of two-pence, ſterling money, per mile for every ton as before-mentioned, and ſo in proportion for any greater or leſſer quan-

tity than a ton; and for the tonnage of all light boats, and other veſſels without a lading, or in ballaſt only, which ſhall be navigated upon or through the ſaid cut or canal, or collateral cut, the ſum of one penny per mile ſhall be taken for every ton burthen of ſuch boats and veſſels reſpectively; lime and lime-ſtone to pay no more than one-fourth, and iron and ſtone only one-half of the rates, tolls and duties aforementioned; and paving ſtones, gravel, and all other materials for making and repairing roads (lime-ſtone excepted); and alſo dung, ſoil, marle, and all ſorts of manure for the improvement of lands and grounds, ſhall paſs free and exempted from tolls or other duties; and no more than threepence, ſterling money, per ton ſhall be taken for wharfage by any perſon or perſons, proprietor or proprietors, land-owner or land-owners, who ſhall or may at any time hereafter make, erect, or build any wharfs or quays on any part of the ſaid intended cut or canal, or collateral cut, by virtue of this act, unleſs the goods, wares, or merchandiſe which ſhall be laid thereon, ſhall remain or continue on ſuch wharf or quay for a longer ſpace of time than ſix days: and whereas the joining and communicating the ſaid canal to the port and harbour of Borrowſtouneſs, upon the frith of Forth, in the county of Linlithgow, will make the ſaid canal greatly more uſeful and beneficial, by opening a ſhorter and more certain acceſs thereto from the ſaid port, and will likewiſe tend to the improvement of the adjacent land, and other good purpoſes; the proprietors afterwards named are impowered to make the ſaid canal, by themſelves, their deputies, agents, officers, workmen, ſervants, and aſſigns, and ſhall make and complete the ſame, not more than ſeven feet deep, navigable for boats, barges, and other veſſels, from the harbour of Borrowſtouneſs, in the county of Linlithgow, through the lands or kerſe of Kinneil, in the ſaid county, to and acroſs the water of Avon, and through the lands of Bearcrofts, in the eaſt kerſe, and continued to the ſaid navigable cut or canal from the Forth to Clyde, at or near where the ſame is intended to join the river Forth in the county of Stirling. And the ſaid proprietors may raiſe money among themſelves to carry on the work, ſo that the whole ſum does not exceed five thouſand

pounds

pounds ſterling, to be divided into one hundred ſhares of fifty pounds each; and if that ſhould not be found ſufficient, a further ſum, not exceeding three thouſand pounds ſterling more, may be raiſed and divided into ſhares of fifty pounds ſterling each; and every five ſhares ſhall have a vote or proxy; and the toll to be collected on the ſaid canal for tonnage and wharfage, for all iron, coals, ſtones, timber, and all other goods, wares, and merchandiſes, and commodities whatſoever, which ſhall be navigated thereon, at the rate of three half-pence per ton per mile, and ſo in proportion for any greater or leſs quantity than a ton; lime, lime-ſtone, and iron-ſtone, not to pay more than one-third of the tolls before mentioned; and paving ſtones, gravel, and all materials for making and repairing of roads (lime-ſtone excepted); and alſo dung, marle, and all ſorts of manure, to be exempted paying any tolls or duties.

In the year 1784 an act paſſed for extending, amending, and altering the powers of the former act. After reciting and mentioning further particulars, this act proceeds as follows: Whereas the ſaid company of proprietors, in order to accommodate the trade upon the ſaid navigation, have expended a conſiderable ſum of money in building a baſin at the eaſt entrance of the ſaid navigation, where veſſels lie to load and unload their cargoes; be it farther enacted, by the authority aforeſaid, that from and after paſſing of this act it ſhall and may be lawful to and for the ſaid company of proprietors, their ſucceſſors and aſſigns, in order to defray the expence of ſupporting, cleanſing, and improving the ſaid baſin, to aſk, demand, and take a wharfage, not exceeding one penny ſterling per ton for all goods landed or put into lighters from, and on all goods loaded into, veſſels lying in the ſaid baſin; and alſo the ſame for goods out of veſſels lying on the weſt ſide thereof; and a wharfage of two-pence ſterling per ton on all foreign veſſels; and one penny per ton ſterling on all Britiſh and Iriſh veſſels, to be paid for veſſels lying in the north and ſouth outer baſin, for the accommodation of larger ſhips and veſſels which cannot enter the inner baſin: and for preventing accidents

cidents by fire in the harbour of Grangemouth, or in any of the harbours or baſins belonging to the ſaid company of proprietors, a bell ſhall be rung morning and evening for the ſpace of ten minutes, and all fires, candles, or lamps at the time of ringing ſuch bell ſhall be extinguiſhed, under a penalty of forfeiting for every offence the ſum of three pounds, ſterling money; nor ſhall any pitch, tar, reſin, turpentine, or other combuſtible matter be heated on board any ſhip or veſſel in the harbour or baſin, under the penalty of five pounds ſterling for every offence.

I cannot more properly introduce an account of the projecting, conducting, and completing of this canal, which has opened a communication between the Atlantic and the Britiſh ſeas, and of which the advantages are ſo obvious, that they may be conſidered as the incentive to all ſucceeding improvements of the ſame kind, that have been or ſhall be made not only in the Highlands but throughout Scotland, than by ſome extracts from the ſecond volume of a work publiſhed by Mr. Knox, in 1785:

Scotland is almoſt divided into two parts by the rivers Forth and Clyde. The Forth falls into the eaſt ſea below Edinburgh, and has a communication with the whole eaſtern coaſt of Great Britain; with France, Oſtend, Holland, Hamburgh, Pruſſia, Dantzic, Ruſſia, Sweden, Denmark, Norway, and Greenland. The Clyde falls into the Atlantic ocean below Glaſgow, and communicates with the weſtern coaſt of Great Britain, with Ireland, the ſouth of France, Portugal, Spain, the Mediterranean, America, and the Weſt Indies. Theſe two rivers, thus falling in oppoſite directions into the two ſeas which environ our iſland, and the neck of land between them being ſcarcely twenty-four miles in breadth, ſuggeſted the idea of a junction between them, to open a communication acroſs the kingdom, and thereby render unneceſſary the long and dangerous navigation by the Land's End and the Pentland frith.

An object of ſuch general utility did not eſcape the attention of Charles

Charles II. (as has been before noticed) who, amidſt all his gallantries, was the great promoter of every deſign which tended to encourage trade and navigation. That monarch propoſed to open a paſſage for tranſports and ſmall ſhips of war, at the expence of 500,000 l.; but the ſum was much too great to be raiſed in his reign, and the deſign was conſequently laid aſide. The affairs of the continent engaged the attention of ſucceeding princes till the beginning of the preſent reign, when the earl of Chatham, endued with all the penetration and magnanimity of an able ſtateſman, propoſed to carry the deſign immediately into execution, at the public expence, on a ſmaller ſcale than the original plan, but ſtill ſufficient to admit veſſels of burthen. Unfortunately the reſignation of that great man, among other cauſes, prevented the execution of a project ſo beneficial to the ſecurity and expedition of the Britiſh navigation in the northern ſeas.

This ſcheme, thus abandoned a ſecond time by the ſtate, was now taken up by individuals, ſome of whom were ſuſpected of private views, inimical to the general welfare of the community; and from this time forward we are to conſider this great work as ſacrificed to the hopes of gain, of influence, and to jobbing, both with reſpect to the courſe of the canal, and to its dimenſions. Nature had pointed out Borrowſtouneſs * on the Forth, and Dalmuire-burnfoot, ſix miles below Glaſgow, on the Clyde, as the two extremities of this inland navigation; but ſuch was the force of influence, that, inſtead of opening the eaſt end of the canal at Borrowſtouneſs, where there is water at neap-tides for ſhips of two or three hundred tons burthen, and ſafe lying, it was begun upon the river Carron, at the diſtance of a mile from its junction with the Forth, and four miles above Borrowſtouneſs, where veſſels of burthen could not float at neap-tides, beſides the delay and inconveniences in navigat-

* Borrowſtouneſs is, next to Leith, the principal trading town on the Forth; Dalmuire is a ſmall village on the Clyde, waſhed by a rivulet called Dalmuire-burn, at the junction of which with the Clyde the canal is to be carried.

ing the Forth and the mouth of the Carron from floods and contrary winds, alſo a circuitous navigation of at leaſt two miles.

The depth of water and dimenſions of the canal came next under conſideration, and gave riſe to much controverſy between the inhabitants of the eaſt country on one part, and a conſiderable number of the inhabitants of Glaſgow on the other. When we conſider that the ſpace to be cut did not, with all its windings, exceed thirty or thirty-two miles, and that this ſhort navigation would at once open a communication between the two ſeas, and all the countries lying upon thoſe ſeas, common ſenſe pointed out the propriety of the greateſt depth of water that the nature of the country would admit. This was the deſire of the nation in general; and it would have been the intereſt of Ireland, and of London, Briſtol, Liverpool, and other towns in England, to have ſubſcribed towards a deſign in which their commerce, eſpecially in time of war, was materially intereſted.

Theſe conſiderations, however, were diſregarded by the merchants; and thoſe of the Scottiſh nation, who were friends to a deep canal, ſeeing themſelves overpowered by their opponents, ſubmitted reluctantly to an imperfect navigation. Mr. Smeaton, an able engineer from Yorkſhire, had eſtimated the expence of four, ſeven, ten, and fourteen feet water. Certain merchants of Glaſgow adopted the ſcale of four feet, which, though ſufficient for the trade of that city, would ſcarcely have anſwered any valuable purpoſe to the nation in general; and it was ſuggeſted, no doubt invidiouſly, that thoſe perſons never meant that the canal ſhould join the Clyde. While a bill for cutting the propoſed ditch of four feet water was before parliament, and on the point of being paſſed, the eaſt country gentlemen and traders took the alarm, objected to the frivolouſneſs and partial utility of the plan, and, fortunately for the public, obtained a bill, extending the depth of water to ſeven feet. It now became neceſſary to open a ſubſcription, to the amount of 150,000 l.

150,000 l. which was ſoon filled; and about 130,000 l. was actually paid.

Mr. Smeaton began this arduous taſk in 1768, and overcame almoſt inſurmountable difficulties till he had got to the extent of nine miles, when, on account of ſome miſunderſtanding between him and the managers of the canal, he reſigned that buſineſs.

Two ſtrangers from Yorkſhire ſoon preſented themſelves, and diſcourſed on the ſubject with ſuch plauſibility, that they were immediately engaged to carry on the work. When theſe men had completed about nine or ten miles, they were diſcharged, and Mr. Smeaton was again employed.

The work was now conducted upon the original principles, till it was brought within ſight of the Kelvin, and ſix miles from the propoſed junction with the Clyde; when the ſubſcription, and a ſubſequent loan, being exhauſted, beyond which the proprietors were unwilling to proceed, the work was ſtopped in 1775. The inhabitants of Glaſgow, however, by means of a collateral branch, nearly three miles in length, have opened a navigable communication from that city to the Forth; and thus the emporium of the north communicates with both ſides of the iſland.

After the experience of ſeveral years, the navigation by the river Carron was found ſo inconvenient, that a new ſubſcription was propoſed for opening a communication from Borrowſtouneſs, to join the canal near Falkirk; and in 1784 a bill was obtained in parliament for that purpoſe; of which an abſtract has before been given.

This work, when finiſhed, will affect the Carron navigation, though every poſſible effort has been made to ſhorten that paſſage. Some years ago a cut was made near the mouth of the river, to ſhun a bend or reach;

and in 1784 the proprietor of the adjoining lands put himſelf to the expence of a ſecond cut, by which the Carron river is now totally avoided. It is a mile in length, and navigable for veſſels of large burthen. Had this cut been made at firſt, there would have been no rivalſhip from Borrowſtouneſs; but the whole buſineſs has been a ſeries of blunders and unneceſſary expence, in which the public-ſpirited proprietors are equally involved with thoſe whoſe ſelfiſh views have proved ſo detrimental to the whole deſign in all its ſtages. The money expended, down to 1783, amounts to 212,000 l. No dividend has yet been made, or can be made, until the debts ſhall be diſcharged; when it may be ſuppoſed that the total expenditure will be increaſed to 220,000 l. or 11,000 l. per annum, while the tonnage, one year with another, does not amount to 7,000 l. About ſix miles, and thoſe the moſt difficult in the whole tract, remained to be finiſhed in 1784; for which government has allowed 50,000 l. from the forfeited eſtates. If to this ſum we add the Borrowſtouneſs expenditure, and the two ſubſequent cuts at the mouth of the Carron, this canal will coſt 300,000 l. or upwards, previous to the firſt dividend; while at the ſame time, the tonnage is rated ſo high, that veſſels carrying bulky goods ſometimes prefer the long paſſage by the Pentland frith.

The dimenſions of this canal, though greatly contracted from the original deſign, are much ſuperior to any work of the ſame nature in South Britain. The Engliſh canals are generally from three to five feet deep, and from twenty to forty feet wide, and the lock-gates from ten to twelve feet; but they anſwer the purpoſe of inland carriage from one town to another, for which alone they were deſigned. The depth of the canal, between the Forth and Clyde, is ſeven feet, its breadth, at the ſurface, fifty-ſix feet: the locks are ſeventy-five feet long, and their gates twenty feet wide. It is raiſed, from the Carron, by twenty locks in a tract of ten miles, to the amazing height of one hundred and fifty-five feet above the medium full ſea-mark. At the twentieth lock begins the canal of partition, on the ſummit between the eaſt and weſt ſeas; which canal of partition continues eighteen miles on a level, terminating

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at Hamilton-hill, a mile north-weſt of the Clyde at Glaſgow. In ſome places the canal is carried through moſſy ground, and in others through ſolid rock. In the fourth mile of the canal there are ten locks, and a fine aqueduct bridge, which croſſes the great road leading from Edinburgh to Glaſgow. The expence of this mile amounted to eighteen thouſand pounds. At Kirkintulloch the canal is carried over the water of Logie on an aqueduct bridge, the arch of which is ninety feet broad, and was thrown over in three different ſtretches, of thirty feet each, having only thirty feet of a centre, which was ſhifted on ſmall rollers from one ſtretch to another. Though this was a new thing, and never attempted before with an arch of this ſize, yet the joinings are as fairly equal as any other part of the arch. The whole is thought to be a capital piece of maſonry. There are in the whole eighteen draw-bridges, and fifteen aqueduct-bridges, of conſiderable ſize, beſides ſmall ones and tunnels.

The ſupplying the canal with water was of itſelf a very great work. One reſervoir is above twenty-four feet deep, and covers a ſurface of fifty acres, near Kilſyth. Another, about ſeven miles north of Glaſgow, conſiſts of ſeventy acres, and is banked up at the ſluice twenty-two feet.

Upon the whole, this canal, when finiſhed, will be one of the greateſt works completed in Britain ſince the time of the Romans. There are twenty locks already finiſhed; the remaining ſix miles will require nineteen more. But the moſt expenſive part of the work will be to carry the canal over the Kelvin river, a conſiderable body of water, which in wet weather ſweeps every thing before it: the depth of the Clyde at Dalmuire-burnfoot, in ſpring-tides, is fifteen feet, and at Dunotter, half a mile below, eighteen feet.

The proprietors now are more ſenſible than ever of their error, in not forming a cut of ten feet water; and propoſals have been made to raiſe

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the banks, ſo as to obtain eight feet; but this, though practicable, would prove expenſive, and poſſibly a fruitleſs attempt. Were we to ſpeculate upon the probable increaſe of trade, commerce, and wealth in that part of the kingdom fifty years hence, 100,000 l. may then perhaps eaſily be raiſed to deepen the canal two or three feet, which would be a more effectual improvement than raiſing the banks; and with a reference to this idea, I aſked Mr. Smeaton, among other queſtions, whether the remaining ſix miles might not be conſtructed for nine or ten feet water? "The banks," ſaid he, "may be raiſed a foot; but you have put another queſtion, that requires ſome conſideration to anſwer with ſafety." If this depth can be effected, it would certainly be rendering poſterity an eſſential ſervice to make the alteration, though the extraordinary expence ſhould amount to twenty, or perhaps five and twenty thouſand pounds.

The canal at preſent, when clear, admits loaded veſſels of ſeventy or eighty tons, and when completed, may be navigated by thoſe of a hundred or upwards, built and rigged on a proper conſtruction. Ships paſſing this canal ought to be built on the ſame plan with thoſe employed by the Dutch, and by the traders of Hamburgh, Dantzick, and other towns on the Baltic; that is, long and flat-bottomed, with lee-boards. All veſſels or lighters proper for navigating large canals, ſhould be fitted out and rigged with one maſt, either as a ſloop or galliot; having one yard aloft, they can take no wind-hold, ſo that they can eaſily paſs the canal, when a ſquare-rigged ſhip could not attempt it; not to mention the detriment done to the locks and banks by high-rigged veſſels.

There are veſſels at preſent in the London trade from Leith, that carry a hundred and thirty tons, drawing only eight feet water, and a ſmall alteration in this model will bring them to ſeven feet; conſequently, when the canal is completed, veſſels of that burthen may trade from the Clyde to the Baltic, Holland, and all parts of Great Britain, without unloading at the entrance of the canal, or any impediment whatſoever, except from occaſional froſts in the winter, and droughts in the ſummer,

ſummer, to which all inland navigations, whether natural or artificial, are ſubject.

Canals, unleſs frequently cleaned, are apt to fill up in certain parts; and though the above-mentioned cut was originally ſeven feet deep, no veſſel drawing above ſix feet and a half can navigate it, unleſs the practice of ſhipping in ſhallow-bay harbours be adopted. As moſt veſſels draw more water in the ſtern than in the bow part of the ſhip, they are trimmed on an even keel till they have paſſed the ſhallows; and by this method half a foot of water may be gained.

Buſſes, and other unavoidably ſharp-bottomed veſſels, belonging to the Clyde, may alſo paſs the canal by means of lighters; the expence of which cannot be great, nor would any additional tonnage be charged.

Upon the whole, this canal, even in its contracted ſtate, will exceed the moſt ſanguine hopes of the public with reſpect to its general utility. The diſtance between the entrance into the Clyde and the Forth is, by the Pentland frith, ſix hundred miles; by the canal ſcarcely one hundred. But this diſproportion of diſtance, in a ſea-voyage, is trifling, when compared with the delays, the ſhipwrecks, the poſitive and caſual expences attending a paſſage by the Hebrides and the Pentland frith, or even by the Land's End, particularly in time of war, when the charge of inſurance is from 15 to 20 per cent. while by means of the inland navigation it ſeldom exceeds 5 per cent.

I have before obſerved, that the canal was ſtopped in 1775, but that a collateral cut was carried to Glaſgow. I have alſo mentioned the act paſſed in 1784, for giving further powers to the proprietors, and extending the canal to Borrowſtouneſs, and alſo the grant of 50,000 l. which government allowed from the forfeited eſtates in Scotland, for this and other public works; when in the beginning of the year 1785 the undertaking was again revived.

Mr. Smeaton having declined the buſineſs on account of his bad ſtate of health, or ſome other motive, Mr. Robert Whitworth, a gentleman of approved abilities, was employed in finiſhing this canal, which was entirely completed on the 28th of July, 1790, when the public opening of the Forth and Clyde navigation from ſea to ſea was made by the ſailing of a track-barge, belonging to the company of proprietors, from the baſin of the canal, near the city of Glaſgow, to the river Clyde, at Bowling-bay. The voyage, which is upwards of twelve miles, was performed in leſs than four hours, during which time the veſſel paſſed through nineteen locks; deſcending thereby one hundred and fifty-ſix feet from the ſummit of the canal into the Clyde. It required only four minutes to paſs each of the locks; in which ſpace the lock deſcended eight feet into the reach of the navigation immediately below. In the courſe of the voyage from Bowling-bay, the track-boat paſſed along that ſtupendous bridge, the great aqueduct over the river Kelvin, four hundred feet in length, exhibiting to the ſpectators, in the valley below, the ſingular and new object of a veſſel navigating ſeventy feet above their heads; a circumſtance which gives this great work a pre-eminence over every thing of a ſimilar kind in Europe, and does infinite honour and credit to the profeſſional ſkill of that able engineer, Robert Whitworth, Eſq; under whoſe direction the remainder, and moſt difficult part of this great undertaking, has been completed in a truly maſterly manner.

The committee of management, accompanied by the magiſtrates of the city of Glaſgow, were the firſt voyagers on this new navigation. On the arrival of the veſſel in Bowling-bay, after deſcending from the laſt lock into the Clyde, the ceremony of the junction of the Forth and Clyde was performed by Archibald Spiers, Eſq; of Elderſlie, chairman of the committee of management, who, with the aſſiſtance of the chief engineer, launched a hogſhead of the water of the river Forth into the Clyde, as a ſymbol of joining the eaſtern and weſtern ſeas together. This great event, ſo important to the trade and navigation of Great Britain,

Britain, and particularly to the towns of Liverpool, Lancaſter, Whitehaven, Greenock, Dublin, Newry, Drogheda, Belfaſt, Londonderry, &c. &c. on the one ſide, and the towns of Lynn, Hull, Newcaſtle, Leith, Dundee, Aberdeen, &c. &c. on the other, as alſo to all the ports in St. George's Channel that trade to Norway, Sweden, and the Baltic, has opened a communication which not only ſhortens the diſtance from eight hundred to a thouſand miles, but alſo affords a more ſafe and ſpeedy paſſage, particularly in time of war, or at the end of the ſeaſon when ſhips are detained long in the Baltic, and cannot attempt the circuitous ſea-voyage without great danger of ſpoiling their cargoes, or being too late for their market. The whole length of this canal navigation, from the Forth to the Clyde, is exactly thirty-five miles, ſixteen of which is, upon the ſummit of the country, one hundred and fifty-ſix feet above the level of the ſea; to which height the veſſel is raiſed by means of twenty locks from the eaſtern ſea, and nineteen from the weſt. Each lock is twenty feet wide, and ſeventy-four feet long between the gates. The depth of the canal is preciſely eight feet throughout, and the medium width fifty-ſix feet on the ſurface of the water, and twenty-eight feet at bottom.

The toll-dues payable on the navigation are two-pence per ton per mile, or five ſhillings and ten-pence per ton for the whole length of the canal; and the time required to paſs from ſea to ſea through the thirty-nine locks will be about ſixteen hours. At Bowling-bay, about the diſtance of nine miles from the entrance, and near the great aqueduct over the river Kelvin, there is a commodious dry dock for careening and repairing veſſels, where every accommodation is afforded to ſhip-owners on moderate terms.

Upon the whole, it muſt be generally admitted that no public work in Great Britain was ever ſo complete in all its parts, or promiſed ſo many advantages to the trade of the country at large; and upon few occaſions has ſuch general ſatisfaction been expreſſed on the approach

of that period when the real utility of this ſplendid undertaking will become apparent to the public, and which, it is to be hoped, will ſoon be ſucceeded by two more canals, northwards towards the Highlands, which will be equally uſeful, although not equally lucrative, to the undertakers; and of which I ſhall immediately proceed to give a ſhort account: but firſt I ſhall preſent the reader with a conciſe recapitulation of particulars relative to the canal I have been deſcribing.

Summary View of the Canal from Forth to Clyde,

	Miles.
The riſe of the canal from lock No. 1 at Grangemouth, to lock No. 20 at the ſummit of the navigation, is one hundred and fifty-ſix feet, and extends	10¼
The ſummit of the canal, or head level, from lock No. 20 eaſt, to the point of partition at lock No. 21, is in length, and extends	16
The fall of the canal from lock No. 21, at the end of the ſummit of the navigation, to lock No. 39 in Bowling-bay, is one hundred and fifty-ſix feet, and extends	8¾
Extreme length of the navigation from lock No. 1 on the river Forth, to lock No. 39 on the river Clyde, is	35
Extreme length of the collateral cut to Glaſgow	2¾
	Feet.
Medium width of the ſurface of the canal	56
Ditto of bottom of the canal	27
Depth of the canal from ſea to ſea	8
Fall of each of the thirty-nine locks on the canal	8
Width of each lock	20
Length of each lock, clear within gates	74
	193

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The canal, in its courſe from the Forth to the Clyde, paſſes over ten large aqueducts or water-bridges, and thirty-three ſmall aqueducts and tunnels; in all forty-three.

There are alſo thirty-three draw-bridges over the canal.

Tonnage-dues are two-pence per ton per mile.

Ditto from ſea to ſea five ſhillings and ten-pence.

From Grangemouth to Glaſgow the tonnage is four ſhillings and ten-pence, and from Bowling-bay to Glaſgow two ſhillings.

A ſhort Account of an intended Navigation between the Atlantic and Lochfyne.

I ſhall here again make a ſhort extract from Mr. Knox.

" Having finiſhed my obſervations on Loch Gilp, I ſet out with an intelligent perſon of that neighbourhood for Loch Crinian, on the weſt ſide of the peninſula. The ground riſes almoſt imperceptibly to the height of eighteen feet above the ſea; and the whole is compoſed of the moſt favourable ſoil, neither too hard nor too ſoft. It is properly a level valley, partly plowed and partly in graſs, environed by hills on the north and ſouth. Nearly at the centre of the valley a rivulet divides itſelf, by falling into two oppoſite directions. One part runs eaſt into Loch Gilp, and the other into Loch Crinian on the weſt. This is properly the point of partition. The rivulet is ſupplied by numerous rills from the high grounds on each ſide; a moſt favourable circumſtance for the purpoſes of a canal.

" Thus the cutting five, or at moſt ſix miles, would anſwer every valuable purpoſe in that diviſion of the kingdom, but more particularly to the Highlanders, who, by finding themſelves brought nearer by a hundred miles to Glaſgow, and its communications with other parts of the iſland, would gradually forget the grievances under which they have laboured. A voyage which frequently takes three weeks, would by this eaſy paſſage be performed in three or four days in all ſeaſons of the year, whether in time of peace or war. By thus cutting off the peninſula of Cantire, the voyage from Glaſgow to the Hebrides would be entirely inland, and thereby ſcreened in a great meaſure from the dreadful tempeſts of the Atlantic."

The expence of a canal of ten feet water, and fourteen locks, is eſtimated by Mr. Watts, the engineer, at 48,405 l. but as large buſſes, being ſharp bottomed, will require, when full loaded, eleven feet water, and as it is propoſed to admit veſſels of 120 tons for the herring fiſhery, I conceive that twelve feet will be more than ſufficient for the purpoſe of fiſheries. But there is another object of very conſiderable importance, though hitherto unnoticed, for which a deep water canal at this place would be eſſentially uſeful; that is, the expedition, facility, and ſecurity by which troops and military baggage would be conveyed between the Highlands and the Clyde, where the troops take ſhipping for the places of their deſtination.

I am happy to hear that the expediency of this navigation is now generally admitted, and that perſons of rank have it ſeriouſly in contemplation. It would ſtill be more pleaſing were government to undertake the completion of it at the public expence *. Highways, inland navigations, the forming or repairing of harbours, have in all ages and countries, Great Britain excepted, been conſidered as public works, and

* Dr. Anderſon adviſes that this work ſhould be completed by private ſubſcription.

conſequently

conſequently executed by the public. In this manner Ireland, France, Denmark, Sweden, and the American States, are at preſent carrying on very extenſive inland navigations. England, whoſe revenue far exceeds that of Ireland, Denmark, and America united, leaves theſe great national objects to the local views of traders and ſpeculators who clog the national commerce with exceſſive tonnage, which they demand to reimburſe them for the money they have laid out, and for annual repairs. Thus the canals in England, works which ſhould be conducted upon the boldeſt plans, are ſtinted in every particular, and executed imperfectly; of which various inſtances might be produced, though now too late for any effectual remedy.

Deſcription of the intended inland Navigation between Inverneſs and Fort William.

A THIRD northern navigation, of very conſiderable utility, alſo claims the attention of the public. Between the ſound of Mull on the weſt, and the Murry firth on the eaſt ſide of the kingdom, there is a level or chaſm compoſed of land and water, which ſeparates the mountains of the middle diviſion from thoſe of the north ſo completely, that, with the aſſiſtance of art, ſhips might paſs between them from ſea to ſea.

On the weſt ſide of this extenſive valley is the Linnke Loch, penetrating from the ſound of Mull twenty-four miles north-eaſt, and ſo capacious that ſhips of the line have been moored as high as Inverlochy, now known by the name of Fort William, or Maryburgh. This fine ſalt-water lake communicates with Loch Creran, Loch Leven, and Loch Eil, all of which are navigable for veſſels of burthen, to which they afford a ſafe retreat when the violent guſts of wind render the Linnke navigation dangerous.

The fiſh peculiar to theſe waters, are herrings, whitefiſh, ſalmon, trout, and phinoes, ſuppoſed to be the young of what the fiſhermen call the great trout, ſome of them weighing thirty pounds. The timber is birch and pine.

The propoſed line of communication from Fort William to Inverneſs lies in an eaſtern direction, and is fifty-three miles in length; the firſt branch of which is the river Lochy, iſſuing from the loch of the ſame name, at the diſtance of ſeven miles and a half. It is a conſiderable river, very rapid, and has a fall of eighty feet. Loch Lochy is a beautiful ſheet of water, ten miles and a half long, half a mile broad, thirty fathom deep where deepeſt, and never freezes. It abounds in ſalmon, trout, and other fiſh peculiar to freſh-water lochs: the banks are ſhaded with natural woods.

At the diſtance of a mile on the north ſide of this loch is Loch Arkek, nearly of the ſame dimenſions with the former; the banks of which are ſhaded with very extenſive woods of fir.

Keeping due eaſt, in the line to Inverneſs, there is a ſpace of two miles without any river: the ſoil, gravel and earth. This may be called the canal of partition, being the higheſt ground in the whole extent of the valley between the two ſeas, and riſes twenty-two feet above Loch Oich, to which it is joined on the eaſt. Loch Oich is four miles long, a quarter of a mile wide, and of ſufficient depth for the purpoſe of navigation. Its ſurface is about a hundred feet above high-water at neap-tides. Its banks and ſome ſmall iſlands are beautified with woods. Here is alſo lime-ſtone ſufficient for the ſupply of the whole country from ſea to ſea, as ſoon as the navigation ſhall be completed.

Near the head of Loch Neviſh, on the weſtern ocean, facing the iſle of Sky, iſſues a rivulet, called Joine Water, which after a ſhort courſe falls

falls into Loch Quich, which is eight miles long. From thence the united waters keep a ſouth-eaſt direction for twelve or fifteen miles, when they fall into Loch Garry, which is ſix miles long. Two miles farther theſe combined ſtreams reach Loch Oich, from whence a river of the ſame name flows five miles eaſtward into Loch Neſs. This river has a fall of fifty-five feet, over a gravelly bottom from thirty to forty yards wide.

Loch Neſs, the glory of the northern Highlands, is twenty-two miles long, from one to two miles broad, and from five to a hundred and forty fathoms deep. This loch has ſome qualities peculiar to itſelf, ſome few waters excepted: it never freezes; and in winter it is covered with a ſteam or ſmoke proportioned to the ſeverity of the weather. It even ſoftens the rigour of the air in the northern climate, and aſſiſts vegetation, particularly the growth of trees, which on the ſouth ſide form one continued wood of ſwall birch, aſh, and oak. Its waters are alſo ſalubrious, and extremely favourable to longevity. The fiſh found in them are ſalmon, trout, pike, and eels. The ſurrounding woods and mountains of this loch, and the whole tract which I have been deſcribing, beſides ſmall cattle, ſheep, and goats, are frequented by ſtags, roes, harts, ptarmigans, grouſe, and black game; as alſo the rare bird called the capercally, or cock of the wood. The principal waters which ſupply this lake, excluſive of the Oich, before-mentioned, flow from the weſtern coaſt to Loch Clunny, and from thence through a valley of many miles, called Glen Morriſon, where they fall into Loch Neſs, near Fort Auguſtus.

From the eaſtern extremity of the lake iſſues the river Neſs, gliding in a copious ſtream through a tract of eight miles to Inverneſs, where it falls into Loch Beaulie, a capacious ſalt-water lake, which communicates with the ſea at a narrow ſtrait called Anderſier, guarded by the modern

Fort

Fort George. The river Neſs flows over gravel, and is from forty to eighty yards wide. Its greateſt depth is four or five feet, the declivity of the ſurface forty-five feet. The tide flows about a mile above the town; but, on account of floods and other obſtructions, the cheapeſt and moſt effectual navigations would be by cuts along-ſide of the rivers, which it has been found are practicable. The whole line of communication, from the ſound of Mull to Inverneſs, compriſes an extent of eighty-two miles, and is thus compoſed of land and water, viz.

Loch Linnke 24 miles, Loch Lochy 10, Loch Oich 4, Loch Neſs 22——in all —— ——	60 miles.
River Lochy 7 miles, river Oich 5, river Neſs 8—in all	20 miles.
Land from Loch Lochy to Loch Oich, the level 122 feet above high-water at neap-tides —— ——	2 miles.
	82 miles.

Width of the canal 70 feet, depth 10 feet, length of the locks 90 feet, width of the locks 25 feet.

	Miles.
The navigation ſaved in a voyage from Inverneſs to the Sound of Mull —— —— ——	200
Ditto from Buchanneſs to ditto —— ——	127
Ditto to veſſels keeping the outſide of the Orkneys at ſeaſons when the Pentland frith cannot be navigated ——	187

Veſſels drawing nine feet water might paſs from Inverneſs to Fort William in three days; ſmall craft much ſooner. The voyage by the Pentland frith is upon an average two weeks, and frequently two months.

The objects of this northern navigation are for the moſt part ſimilar to thoſe of the ſouth; but the expence will be nearly in proportion of three

three to one, viz. the ſouthern canal 60,000 l. the northern ditto, 164,000 l. beſides the value of grounds to be purchaſed *.

* Dr. Anderſon's report to the Lords of the Treaſury, is as follows:

The following is Mr. Watts's ſurvey and eſtimate of Loch Crinian and Loch Gilp paſſage:

By the Crinian and Loch Gilp paſſage the total diſtance between high-water mark on each ſide the iſthmus is ſix miles and one half; the greateſt riſe above high-water neap-tides is ſeventy-five feet.

The following is Mr. Watts's ſurvey and eſtimate by the Tarbet paſſage:

The expence of a canal ſeven feet deep is eſtimated at 34,879 l. Ditto ten feet deep, 48,405 l.

By the Tarbet paſſage, the total diſtance between high-water mark on each ſide the iſthmus is one mile; the greateſt perpendicular riſe above high-water at neap-tides, is forty-five feet.

	£.
The expence of a canal of ſeven feet deep, is eſtimated at —	17,988
Ditto of a canal ten feet deep — — —	23,884
Ditto of a thorough cut, without locks, of twelve feet deep at high-water	73,849
Ditto of ditto at fifteen feet deep —— ——	120,789

Mr. Watts's ſurvey and eſtimate of a canal with ten feet water, from Fort William to Inverneſs.

	£.
The canal upon the Neſs, eight miles, riſe forty-five feet, takes up one hundred and twenty-one acres of land——Expence ——— ———	34,656
The canal upon the Oich, five miles, riſe fifty-five feet, occupies one hundred and one acres of land ——— ——— —	37,699
Greateſt riſe one hundred feet ——— ———	
The canal on the ſummit, deſcending two miles, riſe twenty feet, occupies fifty-nine acres one quarter of land ——— ——— —	28,286
The canal of Lochy, deſcending ſeven feet and a half, riſe eighty feet, occupies one hundred and ſeventy-two acres and a half of land — —	63,389
£.	164,030

The length is the ſame as I have given before from Mr. Knox.

CHAP. XIII.

Account of the Canal from Dublin to the Shannon, in Ireland.—Various Reports of different Engineers on the Difficulty of cutting this Canal, which is not yet completed, notwithſtanding the immenſe Sums it has coſt.—Reſolves of the Canal Company with reſpect to the carrying on the Work, and finding Materials.—Account of the Newry Canal.—Extracts from A. Young's Tour through Ireland.

IRELAND.

An Account of the navigable Canal from the City of Dublin to the River Shannon.

THIS grand canal, from the city of Dublin to the river Shannon, was originally planned by Mr. Omes (the engineer to the Lagan navigation), and carried on under his direction from Dublin into the bog of Allen, at the expence of ſeventy-ſeven thouſand pounds. When the work was advanced thus far, it was diſcovered that ſeveral capital miſtakes had been committed in the levels, the water in ſome places of the canal ſtanding four or five feet deeper than in others; in conſequence of which, the work being almoſt at a ſtand, in the year 1770, the members of the right honourable and honourable navigation boards called in Mr. Vallancy, who ſubſcribes himſelf "Director of Engineers," to ſurvey the works, and adviſe what was proper to be done: but the lord mayor and corporation of Dublin, who had the ſucceſs of this work much at heart, not being ſatisfied with Mr. Vallancy's ſurvey and report, called in Mr. John Trait, engineer, who differed very widely from Mr. Vallancy,

Vallancy, in almoſt every part of his ſurvey and report; and has in general aſſigned good reaſons for ſo doing. Since that time ſome other engineers have been conſulted; yet after all the ſums of money that have been ſquandered away, this canal is far from being completed.

The failure of this great work, which at firſt might have been ſo very eaſily completed at a moderate expence, may juſtly be attributed to the want of an accurate and well digeſted plan and ſurvey; for it does not appear there were any material difficulties in the whole line, but what might have been overcome with great eaſe, had the work been properly conducted by an able and experienced engineer; ſince neither money nor a proper attention to its being laid out judiciouſly was wanting, as may be ſeen by the reſolves of the company of proprietors, which I here ſubjoin, to ſhew how careful they were to be properly ſupplied in time, and prevent the work ſtanding ſtill for materials or utenſils.

RESOLUTIONS of the Company of Proprietors of the Canal Navigation from the City of Dublin to the Shannon, 1771.

" Reſolved, That the beſt, moſt regular, and effectual method of directing and carrying on the buſineſs of the company, and the great national advantages and purpoſes of their incorporation, is by ſelect committees to be choſen by ballot.

" Reſolved, That a ſelect committee of forty-one members be appointed, and called the Court of Directors, any five of whom to be a quorum; that they do meet weekly on every Tueſday morning, or oftener if they ſhall think fit (upon the ſummons of the ſecretary, ordered by three of the court of directors), in the city of Dublin, or in any other place they ſhall think proper; which court of directors ſhall have power to carry into execution all reſolutions, orders, rules, and regulations of the company; to order ſummonſes for calling general

metings ſo often as they ſhall ſee occaſion, giving regular notices thereof: that they ſhall have full power and authority to direct and regulate the carrying on and management of the navigation of the grand canal, and all works thereon, and the purchaſe and management of all ground and land neceſſary for carrying on the ſame, or belonging thereto: alſo that they ſhall have the controul and direction of all officers and ſervants belonging to the company and navigation, who are to receive their orders and directions from the general board and the court of directors only: that all money for carrying on the navigation, and all other purpoſes of the ſame, be paid and diſpoſed of under the general board and direction of the court of directors only; five of the ſaid court to ſign ſuch orders: that all committees do receive inſtructions from the court of directors, and make their reports to them; and in general that the ſaid court of directors do regulate and prepare all buſineſs for the general board and meetings of the company; provided always, that the ſaid court of directors do not in any ſort ſuſpend, invalidate, alter, or contradict the regulations, rules, or orders of the general boards, but the ſame ſhall be binding and concluſive to them, who are to take care to have the ſame carried into execution.

" Reſolved, That a ſelect committee of thirty-one members be appointed, and called, *The Committee to ſuperintend the Works carrying on upon the Canal;* any three of whom to be a quorum: and they are to view and inſpect the ſaid works, and report to the court of directors, from time to time, how the ſame are carrying on; and if any fraud, miſmanagement, or impropriety appears to them, that they do lay the ſame before the court of directors of the company, &c. &c.

" Reſolved, That a ſelect committee of twenty-one members be appointed, and called, *The Committee of Accounts;* that they or any five of them do ſettle and adjuſt all accounts of receipts and payments of all money belonging to the company; and all bills and accounts relative

to

to money are to be laid before them, and to be regulated and ſettled by them, &c. &c.

" Reſolved, That a ſelect committee of twenty-one members be appointed, and called, *The Committee to ſuperintend the Stores* ; any three of whom to be a quorum: that they do view and inſpect the ſtores, and all timber, iron, machines, utenſils and materials brought into the ſame, or made uſe of in or about the ſaid works, &c. &c.

" Reſolved, That all the ſaid four committees ſhall continue until the ſecond Tueſday in November, yearly, and until other committees are choſen and appointed, &c. &c.

" Reſolved, That the committee to ſuperintend the works, and the committee of ſtores, do meet on the firſt and third Thurſday in every month, and the committee of accounts every Thurſday, weekly; and that the ſaid meeting of all the ſaid committees be at twelve o'clock each day at the Navigation Board Houſe, or at ſuch other place, and as often beſide the above meetings as the ſaid reſpective committees, or any three of them, ſhall under their hands direct the ſecretary to iſſue ſummonſes for."

Then follow ſeveral other reſolves and orders relative to the expenditures, balloting for committees, and reports for the well-governing and conducting the buſineſs.

Then follows their agreement for a contract with the city of Dublin to ſupply the city with water from the canal, and their contract with the Navigation Board, to be paid by the city one thouſand pounds, when and as often as the canal company has laid out and expended on the ſaid canal five thouſand pounds.

Then follow the forms of their debentures and transfers; alſo their depoſits, and common ſeal of the company, and their time of calls for payment,

payment, which are as uſual, and not of ſufficient importance to merit being repeated here.

The reſolves relative to the different officers, their ſalaries, duties, and the mode of their election, are as follow :

" Reſolved, That a ſecretary be appointed, at a ſalary of one hundred pounds yearly.

" Reſolved, That it is the duty of the ſecretary that he do iſſue notices of meeting, attend and take the minutes of the company and their committees at their ſeveral meetings, receive all letters, memorials, and petitions, write all letters that ſhall be ordered, and obey all orders; make out reports of all committees, enter the proceedings of the company in a general minute journal, and thoſe of the ſeveral committees in a committee journal ; and that he attend at ſtated days for transferring ſtock, and make regular entries of the ſame.

" Reſolved, That a pay-clerk be appointed, at a ſalary of fifty pounds per annnm.

" Reſolved, That the duty of the pay-clerk be, that he do attend on the canal every Saturday, and at ſuch other times as ſhall be required by the engineer, to receive the returns from the overſeers of the number of labourers employed under them, and to pay them in ſilver, if required, the amount of their ſeveral returns, make up accounts weekly of the amount of each week's payments, and on paſſing them verify them on oath, and pay the engineer's drafts in town.

" Reſolved, That a treaſurer to the company be appointed.

" Reſolved, That an engineer be appointed to the company, for conducting the navigation.

" Reſolved,

" Reſolved, That the engineer be allowed, for himſelf and his clerks, five pounds per cent. upon all ſums which ſhall be expended upon the works only, from the 21ſt of July, 1772; and that he be paid annually the ſum of three hundred pounds, to be deducted from the ſaid five per cent. as a ſubſiſtence for himſelf and clerks, until the work ſhall be completed from Dublin to the river Liffy; the balance to be paid him when ſuch part of the work ſhall be ſo completed.

" Reſolved, That a general ſtore-keeper be employed in Dublin, at a ſalary of forty pounds per annum.

" Reſolved, That the duty of the ſaid officer ſhall be to receive, and take into his care ſuch implements, utenſils, &c. as ſhall be ſent to him, provided that he receives with them an order under the engineer's hand-writing for ſuch implements, &c. which order he is to file, and give in return his receipt, and that receipt is to be given to the engineer; and whatever timber is cut up in the ſtore-yard he muſt keep a regular account of, and the purpoſe to which it was converted. The ſtore-keeper is to act as overſeer of the men who ſhall from time to time be employed in the ſtore-yard, and to make ſuch returns, that when called upon he may be able to verify their exactitude upon oath.

" Reſolved, That the ſeveral officers belonging to this company ſhall be elected annually on the ſecond Tueſday in November."

ORDERS for regulating the WORKS.

" Ordered, That the engineer do build the locks upon the grand canal eighty feet long, clear pool, and ſixteen feet in breadth; and that he do alſo build the ſame with hewn ſtone, in the moſt perfect and permanent manner.

" Ordered, That the engineer do immediately erect mile-ſtones on

the banks of the grand canal; the firſt at one mile from the city baſin, and one at the end of each mile as far as the works are carrying on.

" Ordered, That as ſoon as the mile-ſtones ſhall be erected on the banks, the ſeveral overſeers be required to diſtinguiſh in their weekly returns, not only the denomination of land on which their ſeveral men have been at work, but alſo within what particular mile; diſtinguiſhing alſo each ſpecies of work, or article of expence.

" Ordered, For the more exact regulation of the workmen with regard to the hours of labour, that a chamber alarm-clock be provided, to be fixed up in the engineer's place of reſidence on the line; and that he do cauſe the ſame to be regulated by the poſt-office clock; and that he do direct the ſeveral overſeers to regulate their ſeveral watches thereby.

" Ordered, That no perſon who keeps a public-houſe, or is any way concerned in the keeping one, ſhall be employed as an overſeer of men, or carts that ſhall be uſed in carrying on the navigation.

" Ordered, That a driver be required to attend two carts that ſhall be employed on the works of the company.

" Ordered, That a contract be immediately entered into with Matthew Gamble for ſinking the earthy part lying in the bed of Gollerſtown quarry, and carrying it off to any proper diſtance the engineer ſhall direct, at three-pence per cubic yard for ſinking, and clearing out to a proper diſtance all the quarry-ſtone lying in the line of the grand canal, from Gollerſtown bridge to Stachumney lock-houſe, down to a proper level at the bottom, as ſhall be directed by the engineer; the ſaid Gamble finding his own powder, pumping water, and keeping tools, barrows, and pumps in repair at his own expence, till worn out, then the ſame to be returned to the company's ſtores, and replaced to the ſaid Gamble by new ones, at one ſhilling and ten-pence per cubic yard: and alſo,

alſo, that for preſerving and raiſing all quarry beds found in the ſaid quarry that ſhall be fit for cut-ſtone of every denomination, and for cutting and ſetting the ſame, to be meaſured when ſet, at twelve-pence halfpenny per foot, the ſaid Gamble to be allowed to draw ſubſiſtence weekly for ſtone-cutters and labourers in proportion to their wages, and to have a general ſettlement once every quarter of a year. The ſaid Gamble alſo to employ as many men of every denomination as ſhall be thought neceſſary, and to produce two undeniable perſons, each in five hundred pounds ſecurity, for the due performance of his contract. The company to furniſh the ſaid Gamble with engines, ropes, tools, planks, and pumps of every kind, which the ſaid Gamble ſhall keep in repair as is aforeſaid.

Ordered, " That a contract be entered into with Mark Byrn for ſinking and clearing out the level of the canal between Gollerſtown-bridge and Bally Keally at one ſhilling and nine-pence per cubic yard, as ſpecified in the propoſal.

ORDERS for regulating STORES.

Reſolved, " That all tradeſmen to be employed in the navigation of the grand canal, be recommended by the committee of ſtores to the court of directors for their approbation.

Reſolved, " That the quantity, rates, and prices of all timber, iron, utenſils, and materials neceſſary, be reported from time to time by the committee of ſtores to the court of directors for their conſideration.

Reſolved, " That no article be uſed, or placed to the credit of the company, till approved, &c. by the committee of ſtores.

Reſolved, " That a competent number of ſpades, ſhovels, pick-axes, crows, wheelbarrows, hand-barrows, and ſuch like utenſils, be provided, and lodged in the ſtores for the uſe of the navigation, and given out oc-

caſionally by the order of the engineer; and that the perſon to whom they are given do give a receipt to the ſtore-keeper for the ſame, and that at proper times, and when called upon, ſuch perſon do account with the ſtore-keeper for ſuch articles; and that in caſe he ſhall not produce the ſame, allowing reaſonable wear and tear, the value of ſuch articles not produced ſhall be paid for, or ſtopped out of the hire or wages of ſuch perſon.

Reſolved, "That the overſeers give ſecurity, if required, for the tools delivered to them, and return them into the ſtore-houſe when worn out or broken, that they may be mended, and others delivered out in their room.

Reſolved, "That carpenters, bricklayers, ſtone-cutters, maſons, and joiners, hired and employed by the day, be not ſupplied with tools.

Reſolved, "That the engineer do from time to time examine the ſtores, and conſtantly have them ſupplied with patterns and models of all common iron and timber implements, neceſſary for the navigation, made up in the beſt and moſt workman-like manner; and that he do alſo from time to time lay before the committee of ſtores accounts of what timber, iron machines, and materials, as likewiſe what number of ſpades, ſhovels, pick-axes, crows, wheelbarrows, hand-barrows, and other utenſils, may be wanting for the uſe of the navigation, ſo that they may be provided upon the beſt terms, and in convenient time, before they are immediately wanted.

Reſolved, "That the moſt effectual, cheap, and expeditious method of providing lock-gates, ſcrew-pumps, ſquare-pumps, windlaſſes or capſtans, two and four-wheel trucks (excluſive of iron work), will be to have them made by contract in the ſtore-yard, the company ſupplying the timber; and that an advertiſement be publiſhed for that purpoſe.

Reſolved,

Reſolved, " That it is neceſſary and proper that a carpenter, of approved abilities and character, who will engage to give his whole attention to the company's works, under the direction of the engineer, be engaged; and that an advertiſement be publiſhed for ſuch perſons to give in their propoſals to the ſecretary.

Reſolved, " That the ſeveral patterns of tools and utenſils, ſent in by Mr. Trail in purſuance of the order of the court of directors, be not made uſe of in the works, but be ſet apart and preſerved for the purpoſe of comparing with them the like tools which ſhall be provided by contract.

Reſolved, " That care be taken in the contract for iron and ſmith's work, poſitively to ſpecify that the ſeveral tools ſhall be wrought out of bar iron, and not made in moulds.

Reſolved, " That the committee of ſtores do meet in the ſtore-yard every Friday; and that notice be given to the ſeveral perſons furniſhing ſtores, to bring them in on a Thurſday, to be inſpected the next day by the committee; the contract for iron work to be ſealed up; and the patterns or models of iron and timber implements to be lodged in the ſtore-houſe for the inſpection of the committee.

Reſolved, " To enter into the contract propoſed for ſupplying all kind of iron and ſmith's work that may be wanted for the navigation, at the average price of four-pence halfpenny per pound.

Reſolved, " That the propoſed contract be accepted and entered into for ſupplying the company with wheelbarrows at nine ſhillings, hand-barrows at two ſhillings and ſix-pence, ſhovel and pick-axe handles at five-pence each; and for making two-wheeled trucks at one pound eight ſhillings, and four-wheeled trucks at two pounds five ſhillings and ſix-pence."

Several other rules and orders were alſo made, which it is not neceſſary particularly to enumerate.

The courſe of this canal is from the city of Dublin over the rivers Little Mouell and the Great Mouell, and then acroſs the river Liffy, by Dowingo and the Iſle of Allen into the bog of Allen, and into the river Maiden at Tullimore, which goes into the Bruſna river, and falls into the river Shannon near Moys-town. A canal is cut out of the grand canal in the middle of the bog of Allen into the river Boyne at Edenderry, and another near Clonbullock, into the river Barrow to Moneſteraven, and into another branch of the ſame river at Portarlington; another cut is alſo made to Naaſtown, and a fourth to Johnſtown. Several more cuts, equally uſeful, are in contemplation, the navigation being far from complete. The whole length of the cut from Dublin to the Shannon is ſixty-one miles and a half.

I have before obſerved, that the expence of carrying the canal through the bog of Allen, to the year 1770, when a ſtop was put to it till further and more accurate ſurveys ſhould be taken, was 77,000 l. New ſurveys have been ſince made, and other engineers appointed; but notwithſtanding the vaſt quantity of money laid out, or rather ſquandered away upon it, to the amount of upwards of 300,000 l. it ſtill remains unfiniſhed; and a very intelligent gentleman, who travelled through Ireland from motives of pleaſure and curioſity, aſſured me, in Auguſt 1790, upon his arrival in England, that he had the moſt authentic information, that this grand canal, with all its faults and blunders, has already coſt above half a million of money, yet was ſtill far from being completed; and is in fact what may be called a mere job.

I ſhall conclude what I have to ſay on the canals in Ireland, with an extract from a celebrated performance * on the preſent ſtate of Ireland, which comes down to the year 1780.

* A Tour through Ireland, by A. Young, Eſq; F. R. S.

" I made

" I made ſome inquiries (ſays the writer of that work), and travelled many miles to view ſome of the navigations; and the only one which appeared to me really completed, is the canal from the town of Newry to the ſea, on which I ſaw a brig of eighty or a hundred tons burthen. The ſame canal is extended farther than that town, but ſtops ſhort of the great object for which it was begun and made, viz. the Drumglaſs and Dungannon collieries: this may therefore be claſſed as incomplete relative to the object; but as Newry is a place of conſiderable trade, finiſhing it ſo far has a merit. The great deſign was to furniſh Dublin with Iriſh coals, which was probably feaſible; for the ſeams of coals in thoſe collieries are aſſerted to be of ſuch a thickneſs and goodneſs, as prove them more than equal to the conſumption of half a dozen ſuch cities as Dublin. But two great difficulties were to be overcome: firſt, to make the navigation ſuch that all land-carriage might be ſaved, which was properly a public work; and ſecondly, to work the collieries, which was properly private buſineſs; but, from the utter deficiency of capital in the hands of the individuals concerned, could never have been done without public aſſiſtance. To get over theſe difficulties, parliament went very eagerly into the buſineſs. They granted ſo liberally to the canal, that I think it has been finiſhed to within two or three miles of the collieries. At the ſame time a private company was formed for working the mines, to whom conſiderable grants were made, to enable them to proceed. The property in the works changed hands ſeveral times: among others, the late archbiſhop of Tuam (Ryder) was deeply concerned in them, and entered with great ſpirit into the deſign; but what with the impoſitions of the people employed, the loſs of ſome that were able and honeſt, the ignorance of others, and the jobbing ſpirit of ſome proprietors, parliament, after granting enormous ſums both to the canal and collieries, had the mortification, inſtead of ſeeing coals come to Dublin, to ſee nothing but gold ſent from Dublin, to do that which fate ſeemed determined ſhould never be done, and ſo in deſpair abandoned the deſign to the navigation-board, to ſee if their leſſer exertions would effect what the mightier ones had failed in. A Mr. Ducate, an

Italian engineer and very ingenious architect, has had for a few years the ſuperintendance of the works; but the temper of the nation has been ſo ſoured by diſappointments, that he has not the ſupport which he thinks neceſſary to do any thing effectual.

The importance of the object will appear from this circumſtance: that upon average of ſeven years, from 1764 to 1770, the import of coals amounted to 180,113 tons per annum, and in the next ſeven years, from 1771 to 1777, to 204,566 tons.

From whence it appears, that not only the quantity itſelf is great, but that it is a very riſing import, owing to the increaſe of Dublin, which has enlarged with the increaſing proſperity of the kingdom.

The little effect of all attempts to ſupply Dublin with Iriſh coals, is ſeen by the bounties paid for that purpoſe, amounting to no more, for the laſt ſeven years, than from one to two hundred pounds a year. In the years 1776 and 1777 they were ſo little as eighty-ſix pounds.

Before I entirely diſmiſs this undertaking, I cannot but remark, that nothing can more clearly prove the amazing want of capital in Ireland, than the preſent ſtate of theſe works. The navigation is completed, except two or three miles. I will venture to aſſert that parliament would grant the money for finiſhing it without heſitation, provided any men of undoubted ſubſtance would engage to work the collieries at their own expence; we may therefore aſſert there is water-carriage from ſome of the fineſt ſeams of coals in the world, and at a very ſlight depth, directly into the heart of the ſecond market in the Britiſh dominions, with the advantage of a parliamentary bounty per chaldron on their import to Dublin; yet, with all theſe advantages, nobody has capital enough to undertake the work. This fact ſeems alſo to call for another obſervation. I remember in the Engliſh Houſe of Commons, in the ſeſſions of 1777 and 1778, when the friends of the Iriſh bills urged, that the want

of

of capital in Ireland was ſuch that ſhe could never rival the manufactures of Great Britain, it was replied, that Engliſh capitals would go over to do it for them; but what I have juſt recited proves that this remark is perfectly unfounded. If capitals were ſo readily moved from one country to another, the Drumglaſs collieries would have attracted them, eſpecially as an intereſt for ever is to be purchaſed in them; but the fact is, that removable capitals are in the hands of men who have been educated, and perhaps have made them locally, in ſome trade or undertaking which they will not venture to move. Prejudice and habit govern mankind as much even as their intereſt; ſo that no apprehenſion can be ſo little founded as that of a country loſing the capital ſhe has made, by transferring it to another for greater ſeeming advantages in trade.

The grand canal, as it is ridiculouſly termed, was another inland navigation which has coſt the public ſtill greater ſums. The deſign, as the maps of Ireland ſhew, was to form a communication, by water, between Dublin and the river Shannon, by this cut, moſt of the way through the immenſe bog of Allen. The former plan, of bringing coals to Dublin, was a very wiſe one; but this of the grand canal had ſcarcely any object that ſeemed to call for ſuch an exertion. If the country is examined through which the intended canal was to paſs, and alſo that through which the Shannon runs, it will be found, conſidering its extent, to be the leaſt productive for the Dublin market of the whole kingdom. Examine Leitrim, Roſcommon, Longford, Galway, Clare, Limerick, and thoſe parts of Weſt Meath and King's County which the line of the canal and the Shannon lead through: there are ſcarcely any commodities in them for Dublin: nay the preſent bounty on the inland carriage of corn proves to a demonſtration that the quantity raiſed in all theſe counties for that market is contemptible. What other products are there? Raw wool takes another direction; it goes at preſent from Roſcommon to Cork. Manufactures in that line are very inſignificant: there are ſome at Galway, but the ports of Limerick and Galway are perfectly ſufficient for the ſmall exportation of them. There remains

nothing

nothing but turf; and who at Dublin would burn that, while Whitehaven coals are at the preſent price?

Moſt of the inland navigations in England are carried on, or have been executed, with private funds, and the intereſt paid by the tolls. One ſtrong reaſon for this mode, is the prevention of unneceſſary and idle ſchemes. The manufactures muſt be wrought, or the products raiſed, and feel the clog of an expenſive carriage, before private perſons will ſubſcribe their money towards a cheaper conveyance; in which caſe the very application to parliament is generally proof ſufficient that a canal ought to be cut. Have ſomething to carry, before you ſeek the means of carriage. I will venture to ſay, that if the grand canal was entirely completed, the navigation of it, including whatever the country towns took from Dublin, would prove of ſuch a beggarly account, that it would then remain a greater monument of folly, if poſſible, than at preſent. Some gentlemen I have talked with on this ſubject have replied, "It is a job: it was meant as a job; you are not to conſider it as a canal of trade, but as a canal for public money." But even this, though advanced in Ireland, is not upon principle. I anſwer, that ſomething has been done. Fourteen miles, with numbers of locks, quays, bridges, &c. &c. are abſolutely finiſhed, though only for the benefit of eels and ſkaiting. Why throw this money away? Half what theſe fourteen miles have coſt, would have finiſhed the Newry canal, and perfected the Dungannon collieries. Admit your argument of the job. I feel its weight; I ſee its force; but that does not account for the ſums actually expended. Might not the ſame perſons have plundered the public to the ſame amount in executing ſome works of real utility, from which ſomething elſe might have reſulted than diſgrace and ignominy to the nation?

As to the other navigations, there is in general this objection to be made to them all: however neceſſary they might be, they are uſeleſs for want of being completed: three-fourths are only begun. The gentlemen

men of the neighbourhood of them have had intereſt enough in the navigation board to get a part only voted; and from the variety of undertakings going on at the ſame time, all are, for the ſame reaſon, incomplete. The advantage to the public has been more trifling from all, than from a ſingle one finiſhed. Sorry I am to ſay, that a hiſtory of public works in Ireland would be a hiſtory of jobs, which have been, and will prove of much worſe conſequence than they may at firſt appear. They have given a conſiderable check to allowing grants of money. Adminiſtration, ſeeing the uſes to which it has been applied, has viewed theſe miſapplications, as they are eſteemed, of the public money with a very jealous eye. They have been greatly curtailed; until another very queſtionable meaſure, the bounty on the inland carriage of corn to Dublin, demanded ſo much, as to leave nothing for jobs of a different ſort. That meaſure may be repealed, and the money applied to it will be at the diſpoſal of parliament, either for the common purpoſe of government, or ſome national improvement of a more deciſive nature. The latter may, after ſo many inſtances, be rejected, for fear it ſhould become a job. How melancholy a conſideration is it, that in a kingdom which, from various cauſes, had been ſo fortunate as to ſee a great portion of public treaſure annually voted for public purpoſes, that ſame treaſure ſhould be ſo abominably miſapplied, and pocketed by individuals, as to bring a ridicule and reproach upon the very idea of ſuch grants. There is ſuch a want of public ſpirit, of candour, and of care for the intereſts of poſterity in ſuch a conduct, that it cannot be branded with an expreſſion too harſh, or condemned in terms too pointed; nor does it leſs deſerve our deteſtation, ſhould it be found to flow from political and ſecret motives, which aim at burthening the public revenues to render private factions of more importance.

The coal-mines neareſt the grand canal are principally at Caſtlecomer, the eſtate of lord Wandcosford, who is ſaid to clear ten thouſand pounds annually by them. If the grand canal were finiſhed to the Barrow, he would probably make much more, for that would open a communication

with Dublin; but hills interpoſe, which muſt be cut through for that purpoſe. The carriers at preſent pay five-pence per hundred weight, and ſell them at Dublin for one ſhilling and eight-pence per hundred, after carrying them eighty Engliſh miles.

The good effect of a ſhort canal, cut near the town of Limerick, is very ſenſibly felt; for ſea-coal, which was formerly the fuel of the inhabitants, is ſo diſuſed, that its price is much lowered; turf, the material, and I may ſay, the manufacture of which is all their own, now ſupplying their hearths. If the merchants of Limerick would cut canals oppoſite to the ſhallows in the river Shannon, it would be rendered navigable to Carrick, in the county of Leitrim, a ſpace of ninety miles, which would open a conveyance for grain, timber, iron, coals, turf, &c. and muſt at length turn the current of trade in their favour.

A navigation of near two hundred Engliſh miles in length, by communicating with the canal leading from Dublin through the bog of Allen, might be accompliſhed at a trivial expence, conſidering its utility, and the ſums already laviſhed almoſt to no purpoſe. Such a navigation would in time make Limerick one of the moſt conſiderable places for importation in the kingdom. The large tracts of country on both ſides the river cannot fail of creating a great demand. The ſame cauſe may operate upon the exports, by facilitating the conveyance of beef, mutton, butter, hides, tallow, grain, &c. to a ſea-port. Though the town is ſixty miles from the ſea, ſhips of five hundred tons come up to the quays.

Ireland is at leaſt eight hundred miles in circumference, and contains nearly two thouſand ſquare miles; and yet it is worthy of obſervation, that the inland parts are not, one place with another, above twenty-four miles from the ſea. What a noble field for canals and improvement! I will venture to aver that the money already granted and expended, if properly laid out, would have interſected the country with canals;

canals; and an inland navigation might have been eſtabliſhed throughout the internal part of the whole country, except three or four counties, to the great advantage of the land-owners and manufacturers already eſtabliſhed, the probable ſettlement of many new ones, and the encouragement and improvement of agriculture through every part of the kingdom.

I ſhall conclude with ſtating, from the Journals, the ſums granted by the Iriſh parliament for completing theſe canals and working the collieries; which will ſhew that the fault did not lie in the employers, but in the employed, from 1753 to 1770 incluſive.

	£.
Newry river navigation - -	9,000
Drumglaſs colliery and navigation -	112,218
Dromreagh ditto - -	3,000
Lagan ditto - - -	40,304
Dungarvon aqueduct - - -	1,300
Shannon navigation - - -	31,500
Grand canal - - - -	73,646
Blackwater - - - -	11,000
Barrow river - - -	10,500
Lee river navigation - -	2,000
Minſterkenry collieries - -	2,000

Several other rivers have likewiſe been deepened and cut to improve the inland navigation of the country. The above ſums, however, with other monies granted by the navigation board, ought to have completed the works entirely.

The following ſums were granted by the navigation board only, from 1768 to 1771:

	£.
Newry canal - - -	2,434
Drumglaſs - - -	5,566

	£
Barrow - - -	3,100
Shannon - - -	7,660
Grand canal - - -	4,585
Boyne - - - -	9,507
Fergus - - - -	85

The total of the money paid out of the revenues for inland navigations, collieries, docks, &c. amounts to the enormous ſum of 379,388l.

It is not to be wondered at, that, in 1771, after the grand canal had been ſo long in hand, and after ſuch great ſums had been expended on it, though ſo little was completed, and every thing nearly at a ſtand, the management of it ſhould be taken from perſons ſo unfit for ſuch a work, and committed to others. This alteration, however, has not ſucceeded to the wiſhes of the nation, or promoted the intereſt of the employers.

NORTH AMERICA.

THE United States of America, now in their infancy as a nation, cannot be expected as yet to afford many examples of improvement by canals. That country, if I may be allowed the metaphor, reſembles a young man juſt out of his apprenticeſhip, and ſet up in buſineſs for himſelf, whoſe whole time, care, abilities, and exertions muſt be employed to maintain his credit and ſituation, without his being able for ſome time to afford to lay by any thing for improvements. In like manner America, but lately diſengaged from her dependency on the mother country, and after a war for her freedom, which has deranged, and for a time ruined her finances, cannot be ſuppoſed capable of improving the advantages which nature has beſtowed on her. She poſſeſſes an immenſe ſea-coaſt, the whole length of which is happily ſituated for trade, and abounds with excellent bays and harbours, while the internal

parts

parts of the country are interſected with the nobleſt rivers, many of which are navigable for ſhips of the largeſt burthen for ſome hundreds of miles within land, and even to the very door of the planters; ſo that but little art or improvement by canals are wanting to render that country the moſt convenient for commerce and inland navigation of any on the face of the globe.

But though America is yet only in her infancy in point of independence as a nation, ſhe has experienced the happy effects of improving trade, by the encouragement and bounty of a benevolent parent. Her noble coaſts, bays, rivers, and products, have invited, for half a century, the maritime countries of Europe to engage in her trade; and the Weſt India iſlands belonging to the European ſtates have by her been chiefly ſupplied with the neceſſaries of life, and enabled to ſend home their produce. The profits of her trade, which formerly uſed to be drawn to the mother-country, now centre in her ſtates; and it may with truth be ſaid, that no part of the world is ſo well watered with ſprings, rivulets, rivers, and lakes, as the territory of the United States. By means of theſe various ſtreams, and collections of waters, the whole country is divided into iſlands and peninſulas. The United States, and indeed all parts of North America, ſeem to have been formed by nature for the moſt intimate union. The facilities of navigation render the communication between the ports of Georgia and New Hampſhire infinitely more expeditious and practicable than between thoſe of Provence and Picardy, in France; Cornwall and Caithneſs, in Great Britain; or Gallicia and Catalonia, in Spain. The canals propoſed at South Key, Suſquehannah, and Delaware, will open a communication from the Carolinas to the weſtern counties of Pennſylvania and New-York. The improvements of the Patomak will give a paſſage from the ſouthern ſtates to the weſtern parts of Virginia, Maryland, Pennſylvania, and even to the lakes. From Detroit, on lake Erie, to Alexandria, on the Patomak, ſix hundred and ſeven miles, there are but two carrying places, which together do not exceed the diſtance of forty miles.

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The

The canals now cutting to the Delaware and Cheſapeak will open a communication from South Carolina to New Jerſey, Delaware, the moſt populous parts of Pennſylvania, and the midland counties of New-York. Theſe important works have been ſurveyed; and it is computed that they may be completed for two hundred thouſand guineas. The United States of America will hereafter be converted into a cluſter of large and fertile iſlands, communicating with each other with eaſe and little expence, and in many inſtances without the uncertainty or danger of the ſea.

The vaſt extent of ſea-coaſt which ſpreads before theſe confederated ſtates; the number of excellent harbours and ſea-port towns; the numerous creeks and immenſe bays which indent the coaſt; and the rivers, lakes, and canals which peninſulate the whole country, added to the agricultural advantages and improvements, give this part of the world ſuperior advantages for trade. Add to theſe their proſpects from the fur trade of Canada, the vaſt ſettlements which are making at Pittſburgh, and in other parts in the neighbourhood of Canada, the advantages of inland navigation by means of the lakes, the northern branches of the Ohio, the Patomak, the Suſquehannah and the Hudſon, with many other circumſtances, depending not only on ſituation, but likewiſe on the climate, &c. which muſt neceſſarily in a few years give them a large ſhare of the fur trade.

On the north ſide of the mountains in Orange county, in the ſtate of New-York, lies a very valuable tract, called the Drowned Lands, containing about fifty thouſand acres. The waters which deſcend from the ſurrounding hills being but ſlowly diſcharged by the river iſſuing from them, cover theſe vaſt meadows every winter, and render them extremely fertile; but they expoſe the inhabitants to intermittents. The Wallkill river, which paſſes through this extenſive and amphibious tract, and empties itſelf into Hudſon's river, is in the ſpring ſtored with very large eels in the greateſt plenty. The bottom of this river is a broken rock,

and,

and, from as accurate a ſurvey as poſſible, it is ſuppoſed that two thouſand pounds would be the utmoſt ſum of money wanted to deepen the channel, ſo as to let off all the waters from the meadows, and thereby redeem from the floods a large tract of rich land, for graſs, hemp, and Indian corn. In 1789 the ſtate had it in contemplation to raiſe this ſum, and carry into execution a plan ſo evidently conducive to the general good and profit of the community.

In Pennſylvania the river Swetara, which falls into the Suſquehanna, from the north-eaſt, is navigable fifteen miles. It is now in contemplation to cut a canal about twenty miles from the river Swetara to the river Tulpehoken, a branch of the Schuylkill. Should this be effected, a paſſage would be open to Philadelphia from the Juniatta, the Tyoga, and the eaſt and weſt branches of the Suſquehannah, which water at leaſt 15,000,000 acres. From this junction, the general courſe of the river is about ſouth-eaſt, until it falls into the head of the Cheſapeak bay, juſt below Havre-de-Grace. It is about a mile wide at its mouth, and is navigable for ſea-veſſels only about twenty miles, on account of its rapids. The banks of this river are very romantic, particularly where it paſſes through the mountains. This paſſage has every appearance of having been forced by the preſſure of the water, or burſt open by ſome convulſion of nature.

Beſides the aforeſaid channels between the weſtern waters and the Atlantic, there are two others to which the Pennſylvanians are turning their attention: one from Preſqu'iſle, on lake Erie, to Le Bœuf, down the Allegany river to Kiſkiminitas; then up the Kiſkiminitas, and from thence by a ſmall portage to the Juniatta, which falls into the Suſquehannah: the other from lake Ontario to the eaſt branch of the Delaware, and down that river to Philadelphia. Both theſe are ſaid to be very practicable at no very great expence, and conſidering the enterpriſing ſpirit of the merchants of that city, whoſe object is concentred in promoting

promoting their commerce and trade, it may be reaſonably expected that both theſe communications will be opened and improved.

There is ſtill another communication equally practicable with either of the others, and which has not eſcaped notice: this is between the ſouthern branch of the Tyoga and a branch of the Allegany; the head waters of which are but a ſhort diſtance from each other. The Seneca Indians have informed the Pennſylvanians that they can walk four times a day from the *boatable* waters of the Ohio to thoſe of the Tyoga, at the place now mentioned; and between the Suſquehannah, juſt before it croſſes into Pennſylvania the firſt time, and the Delaware, is a portage of only twelve miles.

Several improvements are carrying on in the ſtate of Virginia; to give an account of which it will be neceſſary to ſurvey thoſe rivers that will be the objects of operation: and firſt, Patomak river. This river is ſeven miles and a half wide at its mouth, four and a half at Nomony bay, three at Aquio, one and a half at Hallooing-point, one and a quarter at Alexandria, oppoſite to which, in the ſtate of Maryland, the congreſs have reſolved to build their new city; and every ſtate is aſſeſſed its reſpective quota for that purpoſe. During the time of building it, the congreſs have reſolved to ſit in the city of Philadelphia till the year 1800, when the new city is to be named, and the congreſs will remove to it as the ſeat of government; the centrical ſituation of which, and the noble river it is upon, muſt command a vaſt trade. Its ſoundings are ſeven fathoms at the mouth, five at St. George's Iſland, four and a half at Lower Matchodic, three at Swan's Point and up to Alexandria; whence there is ten feet water to the falls, which are thirteen miles above Alexandria.

The diſtance from the Capes of Virginia to the termination of the tide-way in this river Patomak, is above three hundred miles; and the river is navigable for ſhips of the greateſt burthen nearly to that place:

from thence it is obſtructed by four conſiderable falls, and runs through a vaſt tract of inhabited country towards its ſource. Theſe falls are, 1ſt, The little falls, three miles above tide-water; in which diſtance is a fall of thirty-ſix feet. 2dly, The great falls, ſix miles higher, where is a fall of ſeventy-ſix feet in one mile and a quarter. 3dly, The Seneca falls, ſix miles above the former, which form ſhort, irregular rapids, with a fall of about ten feet. And 4thly, the Shenandoah falls ſixty miles from the Seneca, where is a fall of about thirty feet in three miles; from which laſt Fort Cumberland is about one hundred and twenty miles diſtant. The obſtructions which are oppoſed to the navigation above and between theſe falls are of little conſequence.

Early in the year 1785 the legiſlatures of Virginia and Maryland paſſed acts to encourage opening the navigation of this river. It was eſtimated that the expence of the canals and other works would amount to fifty thouſand pounds ſterling; and ten years was allowed for their completion. At preſent the preſident and directors of the incorporated company ſuppoſe that forty-five thouſand pounds will be ſufficient for the undertaking, and that it will be accompliſhed in a ſhorter time than was eſtimated. Their calculations are founded on the progreſs already made, and the ſummary mode lately adopted for enforcing the collection of the dividends as the money may become neceſſary. On each ſhare of 100 l. the payment of only 40 l. has yet been demanded.

According to the opinion of the preſident and directors locks will be neceſſary at only two places; the great and little falls; ſix at the former, and three at the latter. At the latter nothing has yet been attempted. At the great falls, where the difficulties were judged by many to be inſurmountable, the work is nearly completed, except ſinking the lock-ſeats and inſerting the frames. At the Seneca falls the laborious part of the buſineſs is entirely accompliſhed, by removing the obſtacles and graduating the deſcent; ſo that nothing remains but to finiſh the chan-

nel for this gentle current in a workman-like manner. At the Shenandoah, where the river breaks through the Blue Ridge Mountains, though a prodigious quantity of labour has been beſtowed, yet much is ſtill to be done before the paſſage will be completed. Such a progreſs has been made, however, that it was expected, if the ſummer had not proved uncommonly rainy, and the river uncommonly high, an avenue for a partial navigation would have been opened by the firſt of January, 1789, from Fort Cumberland to the great falls, which are within nine miles of a ſhipping port.

As ſoon as the proprietors ſhall begin to receive toll, they will doubtleſs find an ample compenſation for their pecuniary advances. By an eſtimate made many years ago, it was calculated that the amount, in the commencement, would be at the rate of 11,875 l. Virginia currency, per annum. The toll muſt every year become more productive, as the quantity of articles for exportation will be augmented in a rapid proportion with the increaſe of population and the extenſion of ſettlements. In the mean time the effect will be immediately ſeen in the agriculture of the interior country; for the multitude of horſes now employed in carrying its produce to market, will then be uſed for the purpoſes of tillage. But in order to form juſt conceptions of the utility of this inland navigation, it will be requiſite to notice the long rivers which fall into the Patomak, and even the geographical poſition of the weſtern waters.

The Shenandoah, which diſembogues juſt above the Blue Mountains, may, according to report, be made navigable, at a trifling expence, more than a hundred and fifty miles from its confluence with the Patomak, and will receive and convey the produce of the richeſt part of the ſtate. The ſouth branch, ſtill higher, is navigable in its preſent condition nearly, or quite, one hundred miles, through extremely fertile lands. Between theſe, on the Virginia ſide, are ſeveral ſmall rivers, that may with facility be improved, ſo as to afford a paſſage for boats. On the

Maryland

Maryland ſide are the Monocaſy, Antietam, and Conegocheague; ſome of which paſs through the ſtate of Maryland, and have their ſources in Pennſylvania.

From Fort Cumberland (or Will's Creek) one or two good waggon roads may be made, by which the diſtance will be about five and thirty miles to the Yohogany, a large and navigable branch of the Monongahela; which laſt forms a junction with the Allegany at Fort Pitt, from whence the river takes the name of the Ohio, until that alſo loſes its current and name in the Miſſiſſippi.

But by paſſing farther up the Patomak than Fort Cumberland, which may very eaſily be done, a portage by a good waggon road to the Cheat river, another branch of the Monongahela, may be obtained, through a ſpace which ſome ſay is about twenty-five miles.

When we have arrived at either of theſe weſtern waters, the navigation through that immenſe country is opened in a thouſand directions, and to the lakes in ſeveral places by portages of leſs than ten miles, and by one portage of one mile only.

Notwithſtanding it was ſneeringly ſaid by ſome foreigners, at the beginning of this undertaking, that the Americans were fond of engaging in ſplendid projects, which they could never accompliſh; yet it is hoped the ſucceſs of this firſt eſſay towards improving their inland navigation will, in ſome degree, reſcue them from the reproach intended to have been fixed upon their national character by the unmerited imputation.

The great Kanhaway is a river of conſiderable note. The principal obſtacle to its navigation begins at what are called the Great Falls, ninety miles above the mouth, below which are only five or ſix rapids, and theſe paſſable, with ſome difficulty, even at low water. From the falls to the mouth of Green-briar river is one hundred miles; and thence to

the lead mines is one hundred and twenty. It is two hundred and eighty yards wide at its mouth.

The Little Kanhaway is one hundred and fifty yards wide at the mouth; it affords a navigation of ten miles only. Perhaps its northern branch, called Junius Creek, which interlocks with the weſtern waters of Monongahela, may one day admit a ſhorter paſſage from the latter into the Ohio.

In the ſtate of North Carolina is a place called Diſmal Swamp, which ſpreads over the whole tract of country which lies between Pamlico and Albemarle ſounds, and needs no other deſcription than is conveyed by its name. There is another large ſwamp, north of Edenton, which lies partly in this ſtate and partly in Virginia.

This ſwamp is owned by two companies; the Virginia company, of which General Waſhington is a member, holds a hundred thouſand acres, and the North Carolina company about forty thouſand acres. It is in contemplation to cut a canal through this ſwamp, from the head of Paſquetank to the head of Elizabeth river, twelve or fourteen miles in length, which will drain this at preſent uſeleſs ground, and convert it to be the beſt in the ſtate.

Theſe are the principal particulars which at preſent can be given of this extenſive country with reſpect to its improvements by canals and inland navigation. A great number of other cuts have been planned, which will make that country in a few years not inferior to the beſt cultivated and improved ſtates in the old world.

I ſhall conclude my obſervations on North America with the following extract from the Journals of Mr. Elkanah Watſon, a gentleman who has travelled much both in Europe and America.

" When

" When the extent of America is conſidered as boldly fronting the old world—bleſſed with every climate—capable of every production—abounding with the beſt harbours and rivers on the globe, and already overſpread with three millions of ſouls, moſtly deſcendants of Engliſhmen—inheriting all their ancient enthuſiaſm for liberty, and enterpriſing almoſt to a fault—what may be expected from ſuch a people in ſuch a country?—The partial hand of nature has laid off America upon a much larger ſcale than any other part of the world. Hills in America are mountains in Europe, brooks are rivers, and ponds are ſwelled into lakes. In ſhort, the map of the world cannot exhibit a country uniting ſo many natural advantages, ſo pleaſingly diverſified, and that offers ſuch abundant and eaſy reſources to agriculture and commerce.

" In contemplating future America, the mind is loſt in the din of cities—in harbours and rivers clouded with ſails—and in the immenſity of her population. Admitting her preſent population to be three millions, and calculating her progreſſive increaſe to continue doubling once in twenty years, as has hitherto been the caſe, at the end of one hundred years there will be ninety-ſix millions of ſouls in United America; which is two-thirds as many as there are at preſent in Europe: and when we conſider the probable acquiſition of people by foreign emigrations, and that the interior and unſettled parts of America are amply ſufficient to provide for this number, the preſumption is ſtrong that this eſtimation will not differ materially from the event. Europe is already aware of the riſing importance of America, and begins to look forward with anxiety to her Weſt India iſlands, which are the natural legacy of this continent, and will doubtleſs be claimed as ſuch when America ſhall have arrived at an age which will enable her to maintain her right.

" The northern and ſouthern ſtates differ widely in their cuſtoms, climate, produce, and in the general face of the country. The middle ſtates preſerve a medium in all theſe reſpects; they are neither ſo level and hot as the ſouth ſtates, nor ſo hilly and cold as the north and eaſtern.

The inhabitants of the north are hardy, induſtrious, frugal, and, in general, well informed; thoſe of the ſouth are more effeminate, indolent, and imperious. The fiſheries and commerce are the ſinews of the north; tobacco, rice, and indigo, of the ſouth. The northern ſtates are commodiouſly ſituated for trade and manufactures; the ſouthern to furniſh proviſions and raw materials; and the probability is, that the ſouthern ſtates will one day be ſupplied with northern manufactures inſtead of European, and make their remittances in proviſions and raw materials."

SOUTH AMERICA.

WE have ſo little knowledge of South America, that it is impoſſible to ſay any thing, with certainty, relative to any improvements by canals or inland navigations carried on in that remote part of the world. The care with which the Spaniards endeavour to keep the ſtate of this country, its productions, and immenſe wealth, a ſecret from the reſt of Europe, prevents us from knowing what works of this kind may have been projected or undertaken: but the natural indolence of its maſters, and the lazineſs of the natives, who have no other proſpect than perpetual ſlavery, render it extremely improbable that any ſuch improvements ſhould be attempted there.

I have mentioned, when treating of the canals of Spain, the project for cutting a canal through the iſthmus of Darien, from Panama to Nombre de Dios; to which I have now to add, that, in the *Collection of Voyages*, vol. iv. mention is made of a great canal, cut to draw down the lake of Mexico, which employed four hundred and ſeventy-one thouſand one hundred and fifty-four men.

Having thus given an hiſtorical account of the canals that have been completed or projected in this and other countries, as far as I have been enabled by my own knowledge, or the relations of hiſtorians and travellers,

lers, I ſhall in the next chapter add ſome practical obſervations and directions, for the uſe of perſons employed in conducting works of this kind.

CHAP. XIV.

Some practical Obſervations relative to the Places proper for Canals—the Supply of Water—the moſt eligible Levels—the Nature of the Ground to be cut through—and the Expence and Mode of Execution.—Deſcription of a Lock, a Tunnel, and an Aqueduct.

IN the foregoing ſheets I have taken ſeveral opportunities to point out and enforce the great and numerous advantages attending canal or inland navigation: I ſhall not here again enlarge on that ſubject, but conclude the work with ſome practical obſervations, which will be found particularly uſeful to perſons about to engage in undertakings of this kind; according to the old adage, "That a good beginning makes a good concluſion." Theſe obſervations I ſhall reduce to the ſix following heads:

1ſt, The places to be benefited in point of trade.
2dly, The ſupply of water.
3dly, The moſt eligible levels.
4thly, The nature of the ground to be cut through.
5thly, The expence of execution.
6thly, The mode of execution.

1ſt. *Places to be benefited in point of trade.*

Trade being the grand ſource from which adventurers in canal ſchemes expect to derive their great profits, ſuch towns, places, &c. muſt be included in the line of a canal, to which the ſafe, expeditious, and eaſy conveyance of merchandiſe, and conſequent enlargement of commerce,

will be of moment. Theſe can be fixed upon only by an accurate ſurvey and knowledge of the country through which the canal is intended to paſs.

2dly. *The ſupply of water.*

It is almoſt needleſs to mention the abſolute neceſſity of a ſupply of water for a canal, which muſt be in requiſite quantities in the ſummit, or reſervoirs, which may be ſupplied by the neighbouring ſprings; or, if theſe fail, water muſt be thrown up by engines from a lower level.

RESERVOIRS are large bodies of water collected together for the uſe of ſuch parts of the canal as are likely to be deficient; into which it is let by ſluices, when and where wanted.

The quantity of water requiſite for the uſe of a canal depends in a great meaſure upon the quantity of trade carried on. A lock full of water muſt be loſt every time a boat paſſes through, which, in a lock whoſe length in the chamber is 75 feet, breadth 7 feet, and lift 6 feet, will be 125 cubic yards of water; which quantity, multiplied by the number of boats likely to paſs through the ſummit lock, will give an idea of the waſte of water. Allowance alſo muſt be made for exhalation and accidents.

3dly. *The moſt eligible levels.*

The moſt eligible LEVEL is certainly that which has the leaſt fall and the feweſt obſtructions, and is beſt adapted to the face of the country.

4thly. *The nature of the ground to be cut through.*

The SOIL moſt favourable for a canal is clay; the moſt unfavourable, ſand. As ſoils approach more or leſs to the quality of clay or ſand, in ſuch proportion are they to be preferred for holding water.

5thly.

5thly. *The expence of execution.*

Of this little can be ſaid, as it entirely depends on the extent, the ſeveral works, &c. which can be accurately known only by an actual ſurvey and eſtimate; the total of which will of courſe be conſidered previous to undertaking works of ſuch magnitude. It may be proper to obſerve, generally, that many locks, bridges, or aqueducts, much tunneling, unfavourable ſoil, &c. will of neceſſity incur great expences.

Laſtly. *The mode of execution.*

The foregoing particulars having been attended to, it becomes neceſſary to enumerate the ſeveral works, uſeful and neceſſary, in the execution of a canal.

For the paſſing and repaſſing of boats, various expedients have been uſed; but experience confirms the uſe of locks, when it becomes neceſſary, by artificial means, to raiſe or let down boats from one level to another.

A LOCK (technically a *pound lock*) is a large baſin, or, more properly, a long ſquare ciſtern, placed lengthways in a river or canal, incloſed by upper and lower gates. The lock ſhould be lined with walls of ſtrong maſonry on each ſide, and at the bottom; or if of wood, ſtout oak piles ſhould be uſed, ſhod with iron, and lined with two inch and half or three inch oak plank, with a floor of the ſame materials, laid on oak ſleepers, dove-tailed and ſpiked into the upright piles.

The uſe, or *locking down*, is thus managed: The lock being full to the level of the upper water, the gates are then ſhut, including the boat to be lowered. The water in the lock is drawn off, in part firſt, by means of the paddles in the gates, and completely by the gates being

opened; when the boat, being upon a level with the lower water, is able to proceed upon its paſſage. For aſcending, or *locking up*, the boat being in the lock, the lower gates are ſhut: the lock is then filled by the upper water, firſt by the ſluices, and finally by the gates being opened: thus the veſſel is on a level with the upper water, and may immediately proceed. This operation takes but little time; the whole will generally be completed in five minutes. As the gates are ſtrained in proportion to the depth of water ſupported, when the perpendicular height of the water is twelve or thirteen feet, more locks than one become abſolutely neceſſary. Thus if the fall of water be ſeventeen feet, two locks are required, each having eight feet ſix inches fall; and if the fall be twenty-ſix feet, three locks are neceſſary, and ſo in proportion, few locks having leſs than ſix feet, or more than ten feet fall.

The ſide-walls of a lock muſt be of the greateſt ſtrength, whether of maſonry or timber; and where the natural foundation is bad, eſpecial care muſt be taken. Land-ties ſhould be uſed, in order to reſiſt the great preſſure of the earth from behind. Theſe may be further ſtrengthened, if of maſonry, by making the ſides of the lock of a circular form; the walls alſo ſhould be well backed with ſtiff clay, as well to prevent the waſting of the water, as the works being ſecretly undermined.

DESCRIPTION *of Plate I. which ſhews the* PLAN, *&c. of a* LOCK *for a* CANAL.

A. The upper water of the canal.
B. Lower ditto.
C. Chamber of the lock.
D. The platform on which the upper gates are hung.
E. The lower ditto, ſhewing the manner of conſtruction.
F. Sluices through which the water paſſes into the chamber, to raiſe it equal with the upper level.

G. Paddles

G. Paddles in the gates, to reduce the water to the lower level. There is a *chain-bar*, run with lead in a courſe of ſtone, ſet at water level.

A TUNNEL is a perforation, for the paſſage of boats through a hill, for ſome or all of the following reaſons: To ſave the purchaſe of land in going a long way round, or to ſave the labour, in cutting a canal the length required in going that round, or when, in ſome inſtances, a level cannot be found.

The manner of cutting a tunnel through a hill or mountain varies according to the quality of the ſoil; whether ſtone, looſe ſtones, earth, ores of different kinds, chalk, &c. In either caſe the progreſs is very ſlow and expenſive. From three to ſeven guineas per yard, forward, have been paid for labour only.

The tunnel at Sapperton is rock-ſtone, conſequently it was obliged to be blown up, piece-meal, by gunpowder. It was intended to have formed an arch, over head, out of the ſolid rock, and to have avoided turning one by hand; but this not being practicable, it became therefore neceſſary to work an arch of ſtone on centres, to prevent the looſe ſtone falling in. The length of this tunnel is about two miles and three quarters: it has air-holes, or vents, at various places, of different magnitudes; ſome of the openings being left, which were firſt made to take up the refuſe, or fragment ſtone.

The celebrated tunnel through Harecaſtle-hill, Staffordſhire, was cut under the direction of the ingenious Mr. Brindley. As the ſoil was chiefly looſe ſtone, he cauſed the bed of the canal to be rammed with well-tempered ſtiff clay, a foot thick, and turned an arch above with bricks; taking care to have the ſpandrells worked cloſe every yard, as the arch proceeded; which was alſo pinned up to the top at the ſame diſtances. Theſe precautions have had the deſired effect, no accident

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having happened ſince it was finiſhed; nor has the water oozed through, to the detriment of the canal, but all the purpoſes expected have been well anſwered.

An AQUEDUCT is a ſtructure to convey a canal over rivers, moraſſes, or low grounds. I have already deſcribed thoſe over the river Irwell, and acroſs the Sale-moor, conſtructed by the late Mr. Brindley for the duke of Bridgewater: but the largeſt in Great Britain (if not in Europe) is that lately finiſhed by Mr. Whitworth, the engineer to the Forth and Clyde navigation in Scotland, over the river Kelvin, which conſiſts of four arches, and carries the canal over a valley ſixty-five feet deep, and four hundred and twenty feet in length; exhibiting a grand effort of ingenuity and labour. In the courſe of this canal, for a conſiderable way, there is an embankment twenty feet high: the water is ſixteen feet deep. Two miles of the canal is cut through a deep moraſs. At Kirkintilloch the canal is carried over Loggie water on an aqueduct arch of ninety feet ſpan. This arch was thrown over in three ſtretches, having only one centre of thirty feet, which was ſhifted on ſmall rollers from one ſtretch to another; a mode ingenious and novel for an arch of this ſize. The joinings are fair, and as equal as any other part of the ſtructure; which is admitted to be a piece of very fine maſonry.

To ſupply this canal with water was a very arduous taſk. There is one reſervoir of fifty acres, twenty-four feet deep; and another of ſeventy acres, twenty-two feet deep, in which many rivers and ſprings terminate. Theſe, it is expected, will afford a ſufficient ſupply of water at all times.

Plate II. ſhews a deſign for an aqueduct which croſſes a river the width of the three centre arches; and, to occupy the remaining ſpace uſefully, the extreme arches are converted into warehouſes.

a. The

a. The river. b. The canal. c. Towing-path. d. Warehouſes. e. A bed (technically a *punn)* of clay, to prevent the water weeping through the arches. f. The canal continued by embankment.

In the line of a canal many BRIDGES are generally neceſſary. We give a deſign for one ſuitable for a public road, and conſtructed on the moſt economical principles.

Plate III. *Elevation, &c. of a Bridge.*

a. The canal. b. Plan of the foundation. c. Towing-path under the bridge. d. Plan of the ſuperſtructure.

Alſo, a canal in its courſe often divides lands with which ſome communication is neceſſary for the purpoſes of huſbandry. The eaſieſt method is ſhewn on plate IV. This is called *an accommodation bridge.* It hangs by large hooks and eyes, or hinges, and is worked up and down with eaſe, by means of the balance poles. This view alſo ſhews a towing-path gate, which is uſed for dividing grounds, and is hung ſo as always to fall to.

In whatever part of a canal buſineſs is intended to be carried on, there will require to be a wharf, with ſufficient ſpace for loading and unloading goods, with warehouſes, weighing-engines, and cranes, for the uſe of the trade; and where this is extenſive, a BASIN is requiſite, to accommodate boats which wait to diſcharge their lading, without interrupting the regular navigation on the canal.

The regular *drainage* of lands is often interrupted by the line of a canal; to remedy which the water-courſe is continued by a CULVERT, which is a circular drain continued under the bed of the canal, coated with clay. As water cannot always be ſupplied in due quantities for the uſe of a canal from the natural flow of rivers, &c. it becomes neceſ-

ſary

ſary to ſupply this deficiency from rivers, ponds, mines, &c. on a lower level, by means of engines; and for this purpoſe, the moſt powerful is the ſteam-engine.

Having now enumerated the ſeveral articles of moſt importance to be known, I ſhall beg leave to conclude with one word of advice of general uſe; which is, that all works for the uſe of canals ſhould in all caſes be built in the moſt ſubſtantial and workman-like manner poſſible, and of the beſt materials and conſtructions; for in ſo doing, much future expence and inconvenience will be avoided in *repair*, perhaps in *rebuilding*. Were it neceſſary, many recent misfortunes might be mentioned to this purpoſe; but theſe would appear invidious. In all caſes contracts ſhould be made full and explicit with reſpectable perſons, and ſufficient prices allowed. Theſe will moſt likely inſure the ſeveral works being properly performed; not that it is prudent to rely entirely on them: the workmen ſhould be looked after, and the materials well examined in the progreſs of the works, by careful and able inſpectors.

POSTSCRIPT.

SINCE this work went to preſs ſeveral new canals have been planned, and acts of parliament obtained in conſequence; and many more are now under conſideration, which being at preſent in a ſtate of uncertainty, cannot now be deſcribed. Of thoſe which have been rendered certain, by acts being procured, the following is a conciſe account:

In 1791 an act paſſed for making, cutting, and maintaining a navigable canal from the city of Hereford, by the town of Ledbury, to the city of Glouceſter, with a collateral cut to the town of Newent, in the county of Glouceſter, which will open a communication with ſeveral very valuable mines of coal, and quarries of lime-ſtone, and a new and eaſy channel for trade between not only the city, but the whole county of Hereford, and the ſeveral ports of London, Briſtol, Liverpool, and Hull; as alſo with the interior parts of South Wales. This canal is to be forty-two feet wide. The expence is eſtimated at 75,000 l. with liberty to raiſe 30,000 l. more, if wanting, to complete the undertaking.

In the ſame year another act paſſed for making a navigable canal from Kington, in the county of Hereford, through or near Leominſter, into the river Severn, near Stourport-bridge, in the county of Worceſter; which will be of the utmoſt utility in working and vending the coals from thoſe extenſive collieries, and lime-ſtone from the quarries, as well as ores of different kinds. The land to be taken for the purpoſe of the canal and towing-paths to be twenty-ſix yards, and in ſome particular places, and for particular purpoſes, the breadth may be ſixty yards; and the company is impowered to raiſe, for the purpoſe of making the canal, wharfs, quays, bridges, &c. &c. the ſum of 150,000 l. and if that

is not ſufficient, may ſubſcribe or borrow more without applying again to parliament.

In this year alſo another act paſſed for making a navigable canal between the Loughborough canal and the town of Leiceſter. This canal is to commence on the north ſide of the town of Loughborough, in the county of Leiceſter, proceed to the town of Leiceſter, and from thence into the river Soar, at the village of Quorndon. By the ſame act the river Soar is to be made navigable to its junction with the river Wreake, and to Copington, Thurmaſton, and the coal-pits and lime-works of Swannington, Coal Orton, Thringſton, Breedon, and Gracedieu, all in the county aforeſaid, which will extend the navigation, ſale, and conſumption of various goods and manufactures, as well as coals and lime, to the ports of Hull, Briſtol, and Liverpool, the cities of London, Glouceſter, Worceſter, and Hereford, and the towns of Birmingham, Wolverhampton, and Mancheſter, as well as to many other towns and intermediate villages. This canal is to go into the baſin or reſervoir; and the navigation, or canal which is made from the town of Loughborough, into the river Trent. The breadth of the canal and towing-paths is confined to twenty yards; and the company is impowered to raiſe 46,000 l. to complete the ſame; and if that ſum is inſufficient, they are further impowered to raiſe 20,000 l. more, or any leſs ſum, if wanting, to finiſh.

The utility of the canal was ſo obvious, that in the ſame year another act was obtained for making a canal from Melton Mowbray, in the county of Leiceſter, to join the aforeſaid canal from Leiceſter to Loughborough, which muſt be equally beneficial, by conveying the produce of the mines and manufactures with which that part of the country abounds, to the cities, ſea-ports, and towns before-mentioned. The breadth of the canal, towing-paths included, is limited to twenty yards; and the expence is eſtimated at 25,000 l.

In

In this year, likewiſe, another act was obtained for making a navigable canal from Mancheſter, by the village of Little Lever; where one branch is to lead to the town of Bolton, and another branch to the town of Bury; which latter is to be continued to Weddell Brook, all in the county of Lancaſter. The town of Mancheſter having experienced an amazing increaſe of trade ſince the Duke of Bridgewater's firſt ſcheme of canals was carried into execution, it is not to be wondered at that it ſhould promote and ſet forward the above: indeed it is a matter of ſurpriſe to numbers in the mercantile line that it was not begun ſooner, eſpecially as the whole country is one continued mine of coal, metals and minerals, as well as manufactures. The breadth of this canal, and towing-paths, is not to exceed twenty-ſix yards. The ſum of money allowed to complete this undertaking is 47,700 l. but ſhould that be found inſufficient, 20,000 l. more may be raiſed, either by ſubſcription or mortgage.

In the ſame year another act paſſed for cutting a canal from near the town of Birmingham, to communicate with the Severn near the city of Worceſter, at a place called Diglis; which canal will have the additional advantage of a nearer carriage to Briſtol, Worceſter, and Glouceſter, from Birmingham. That town having experienced the greateſt benefit to its trade by means of canals, with which it is ſurrounded, has planned this new one, which bids fair to exceed all the reſt in point of convenience and advantage.

BRITISH MUSEUM

A

TABLE

OF

CANALS IN ENGLAND.

		Length. M.	F.	Ch.	Rise. Ft.	Is.	Fall. Ft.	Is.
Severn and Thames Canal.	From Stroud to Sapperton Tunnel -	7	3	0	241	3	0	0
	From Sapperton Tunnel to Upper Siddington, and the Branch to Cirenceſter	9	0	8	L.			
	From Upper Siddington to Lechlade -	13	4	9	0	0	130	6
Stroudwater Canal.	Stroud to the River Severn - -	8	0	3	0	0	102	0
Birmingham and Fazeley Canal.	From Farmer's Bridge, near Birmingham, to Salford Bridge - -	3	0	6	0	0	156	0
	From Salford Bridge to Fazeley - -	11	7	9	0	0	90	0
	Collateral Branch to Digbeth - -	1	1	3	0	0	38	0
Birmingham extenſion Canal.	From Rider's Green to Broadwater Fire Engine - - -	2	4	6	0	0	46	0
Wolverhampton Canal.	Haywood to Junction of Birmingham Canal - - -	22	4	0	125	0	0	0
	Junction to the River Severn - -	24	0	0	0	0	301	0
Birmingham Canal.	Wolverhampton Canal to Summit at Smithwick - - -	16	7	0	150	8	0	0
	Summit to Birmingham - -	5	6	0	0	0	36	0
	A Branch to the Collieries - -	4	1	0	0	0	18	0
	Another Branch to ditto - -	0	6	5	L.			
	From the Junction of the Wolverhampton Canal, to ditto of the Dudley Canal	5	0	2	191	3	0	0
	The Branches to Stourbridge and Penſnett	2	1	4	L.			
Stourbridge Canal.	From the Wolverhampton Canal to the Reſervoir on Penſnett Chace -	6	1	0	191	3	0	0
Dudley Canal and Tunnel.	From Stourbridge to the Branch from the Reſervoir - - -	1	2	5	L.			
	From the Junction with the Stourbridge Canal at Black Delft to Dudly Pariſh	2	0	4	0	0	75	0
	From Dudly Pariſh to the Birmingham Canal at Tipton - -	2	3	6	0	0	31	0
Duke of Bridgewater's Canal.	Worſley to Mancheſter and Preſton Brook	29	2	0	L.			
	Preſton Brook to low Water at Runcorn	0	0	0	0	0	95	0
	Branch to Stockport - - -	7	4	0	60	0	0	0
Canal from the Trent to the Merſey.	Preſton Brook to Harecaſtle - -	30	1	0	326	0	0	0
	Harecaſtle to the River Trent -	63	0	0	0	0	316	0
Coventry Canal.	Staffordſhire Canal to Atherſtone -	21	0	0	95	0	0	0
	Atherſtone to Coventry - -	14	4	0	L.			
	Branches to Collieries - -	1	4	0				

A TABLE of CANALS in ENGLAND.

		Length. M.	F.	Ch.	Rise. Ft.	Is.	Fall. Ft.	Is.
Oxford Canal.	Coventry Canal to Hilmorton -	20	1	0	L.			
	Hilmorton to Top of Napton Field -	17	1	5	88	0	0	0
	Top of Napton Field to Claydon -	8	5	1	L.			
	Claydon to Oxford - -	36	0	7	0	0	204	0
Droitwich Canal.	Droitwich to Severn - -	5	5	0	0	0	56	6
Chesterfield Canal.	Chesterfield to Norwood - -	11	6	8	45	0	0	0
	Norwood to Worksop - -	8	1	5	0	0	85	0
	Worksop to River Trent at Stockwith	21	6	5	0	0	250	0
Chester Canal.	Chester to Barbridge - -	14	5	9	170	10	0	0
	Barbridge to Middlewich - -	8	5	3	0	0	40	0
	Ditto to Nantwich - -	3	3	0	626	0	0	0
Langley Bridge Canal.	Langley Bridge to River Trent -	11	5	4	0	0	108	8
Leeds Canal.	Low Water at Liverpool to Fouridge -	66.	0	0	525	0	0	0
	Fouridge to the River Air at Leeds -	42	0	0	0	0	446	0
Caldon Canal and Railway to Lime Works.	Trent and Mersey Canal to Stanly Moss	6	6	2	75	0	0	0
	Stanly Moss to Froghall - -	9	4	9	0	0	60	10
	Railway from Froghall to Caldon Lime Works - - -	3	1	7	L.			
Sankey Canal.	Low Water in the River Mersey to St. Helen's - - -	12	0	0	90	0	0	0
Huddersfield Canal to Cooper's Bridge.	Huddersfield to Cooper's Bridge -	8	0	0	0	0	56	10
Liverpool Canal to Kendal, Westmorland.	Liverpool to Kendal - -	72	0	0	86	6	0	0
	N. B. 54½ Miles Level.							
Basingstoke Canal to Weybridge.	Basingstoke to Weybridge - -	44	0	0				
Andover Canal to Redbridge.	Andover to Redbridge - - -	22	4	0	0	0	176	9
Winston Canal, in Durham, to Stockton on Tees.	Winston to Stockton - -	27	0	0	0	0	328	0
Cardiff to Merthyr Tidwell Canal.	Cardiff to Merthyr Tidwell, Glamorganshire - - - -	25	0	0				
Swansey Canal to Furno Vaughan.	Swansey to Furno Vaughan, ditto -	13.	0	0				
Kidwelly Canal to Mr. Keymer's Coal Mines.	Kidwelly to Keymer's Coal Mines, Carmarthenshire - - -	3	2	0				
Forth and Clyde Canal, Scotland.	From Grangemouth, Lock No. 1. to Lock No. 20. - - -	10¼	2	0	156	0	0	0
	From Lock No. 20. to Lock No. 21. -	16	0	0	L.			
	From Lock No. 21. to Lock 39. -	8	0	0	0	0	156	0
	Collateral Cut to Glasgow - -	2	0	0				

N. B. The Letter L denotes the Canal to be level.

Difference of Prices of Carriage of Goods by Canal and Land.

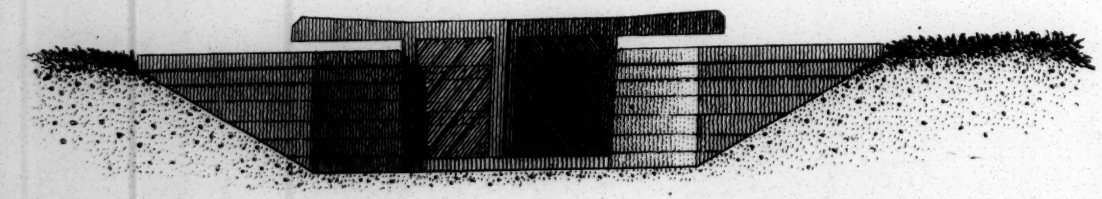
	By Canal. Per Ton.			By Land Per Ton.		
	£.	s.	d.	£	s.	d.
Between Gainſborough and Birmingham - - -	1	0	0	0	0	0
——— Manchester and Etruria, the Centre of the Potteries -	0	15	0	2	15	0
——— Ditto and Bromley Common, three Miles to Litchfield -	1	0	0	4	0	0
Land-carriage from thence to Litchfield - -	0	0	0	0	2	6
——— Ditto and Shardlow, ſix Miles from Derby - -	1	10	0	3	0	0
Land-carriage from Shardlow to Derby - -	0	0	0	0	5	0
——— Ditto and ditto, twenty Miles from Leiceſter - -	1	10	0	6	0	0
Land-carriage ditto to ditto, twenty Miles - -	0	0	0	0	16	8
——— Ditto and Nottingham - - - -	2	0	0	4	0	0
——— Ditto and Newark - - - -	2	0	0	5	6	8
——— Ditto and Wolverhampton - - -	1	5	0	4	13	4
——— Ditto and Birmingham - - -	1	10	0	4	0	0
——— Ditto and Stourport - - -	1	10	0	4	13	4
N. B. Packs of Wool and Pockets of Hops being very bulky Articles - - - -	2	0	0	0	0	0
——— Liverpool and Etruria - - - -	0	13	4	2	10	0
——— Ditto and Bromley Common - - -	1	0	0	0	0	0
——— Ditto and Shardlow - - - -	1	10	0	0	0	0
——— Ditto and Nottingham and Newark - -	2	0	0	0	0	0
——— Ditto and Wolverhampton - - - -	1	5	0	5	0	0
——— Ditto and Birmingham - - - -	1	10	0	5	0	0
——— Ditto and Stourport - - - -	1	10	0	5	0	0
——— Cheſter and Wolverhampton - - - -	1	15	0	3	10	0
——— Ditto and Birmingham - - -	2	0	0	3	10	0
——— Ditto and Stourport - - -	2	0	0	3	10	0
The Freight between Gainſborough and Shardlow (being the Junction of the Canal with the Trent), and between Briſtol and Stourport (being the Junction of the Canal with the Severn), will be about, per Ton. - -	0	10	0	0	0	0
N. B. The above Prices are only for periſhable Goods; thoſe not periſhable will be carried at a lower Price.						
——— Forth and Clyde, the whole Diſtance from Sea to Sea, or Two-pence per Mile per Ton - - -	0	5	10	0	0	0

FINIS.

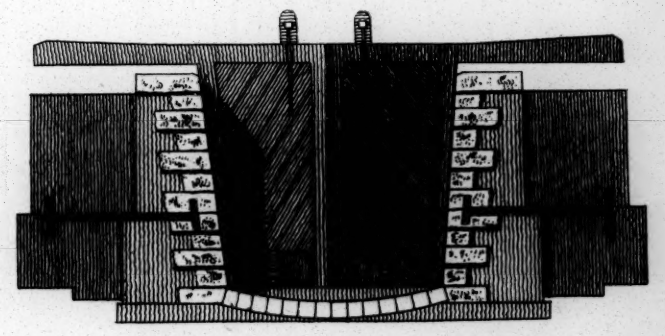
BRITISH MUSEUM

Lock for a Canal.

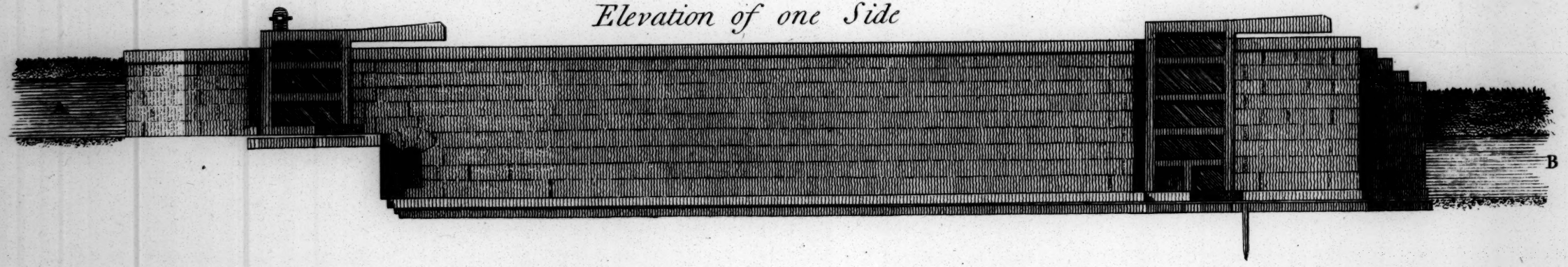
Upper Gates



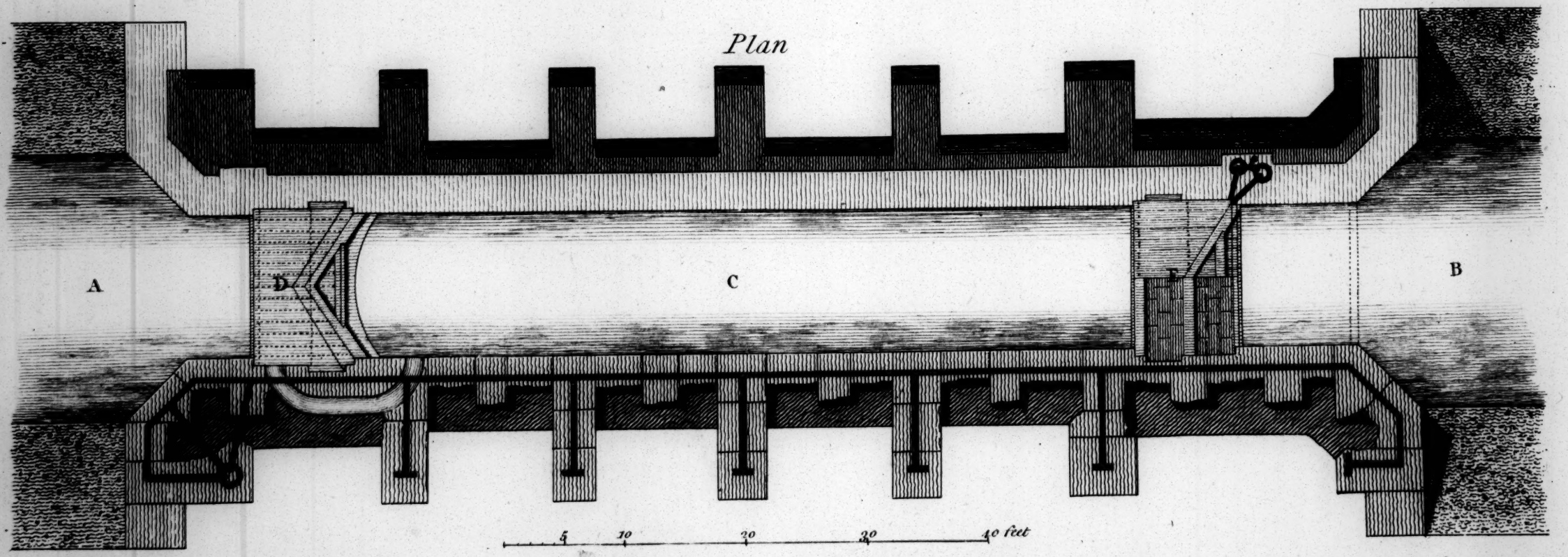
Lower Gates



Elevation of one Side

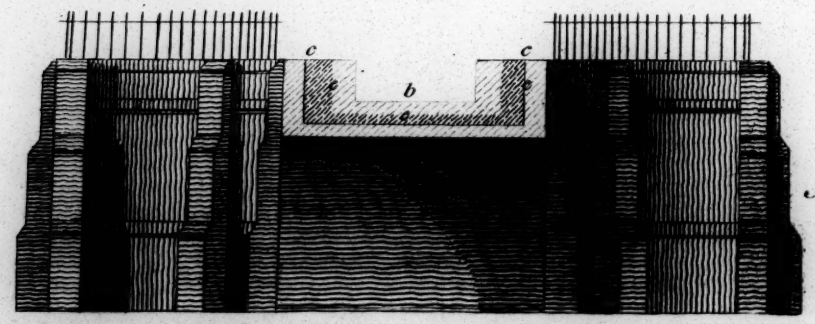


Plan



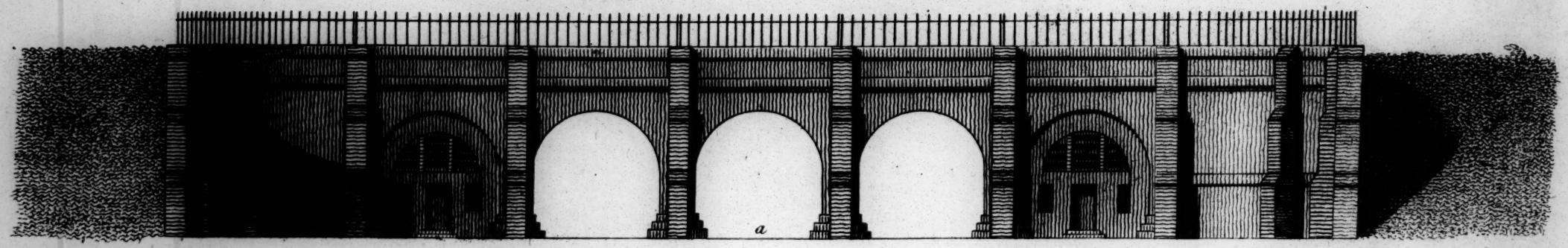


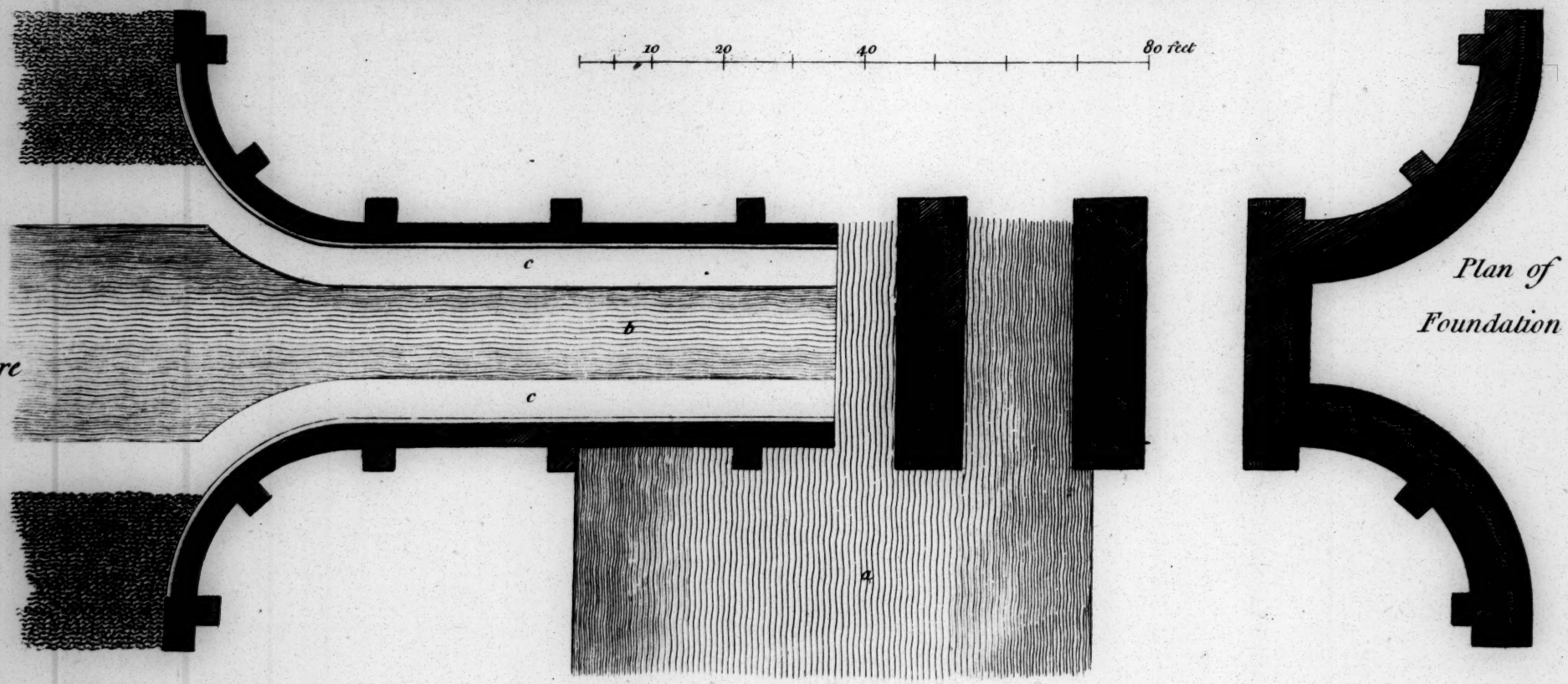
Aqueduct for a Canal.



Section

Elevation





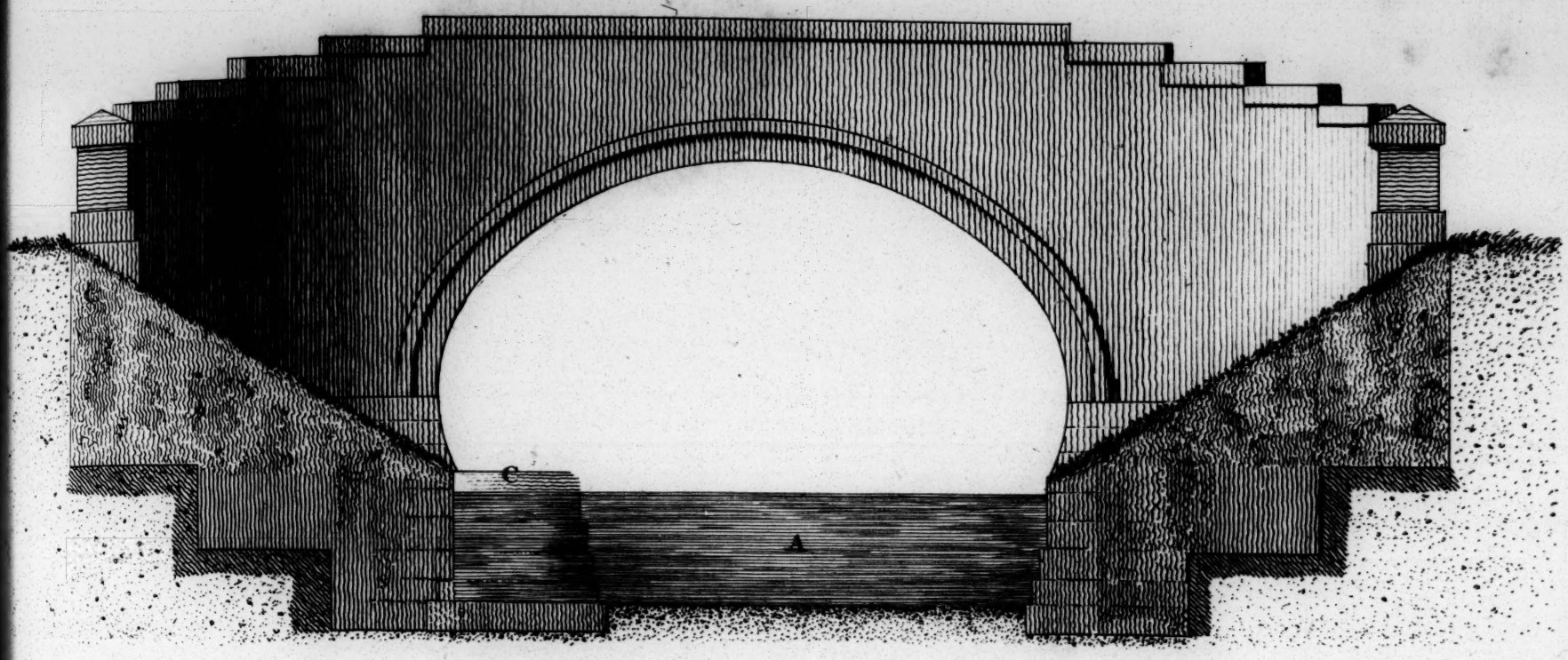
Plan of Superstructure

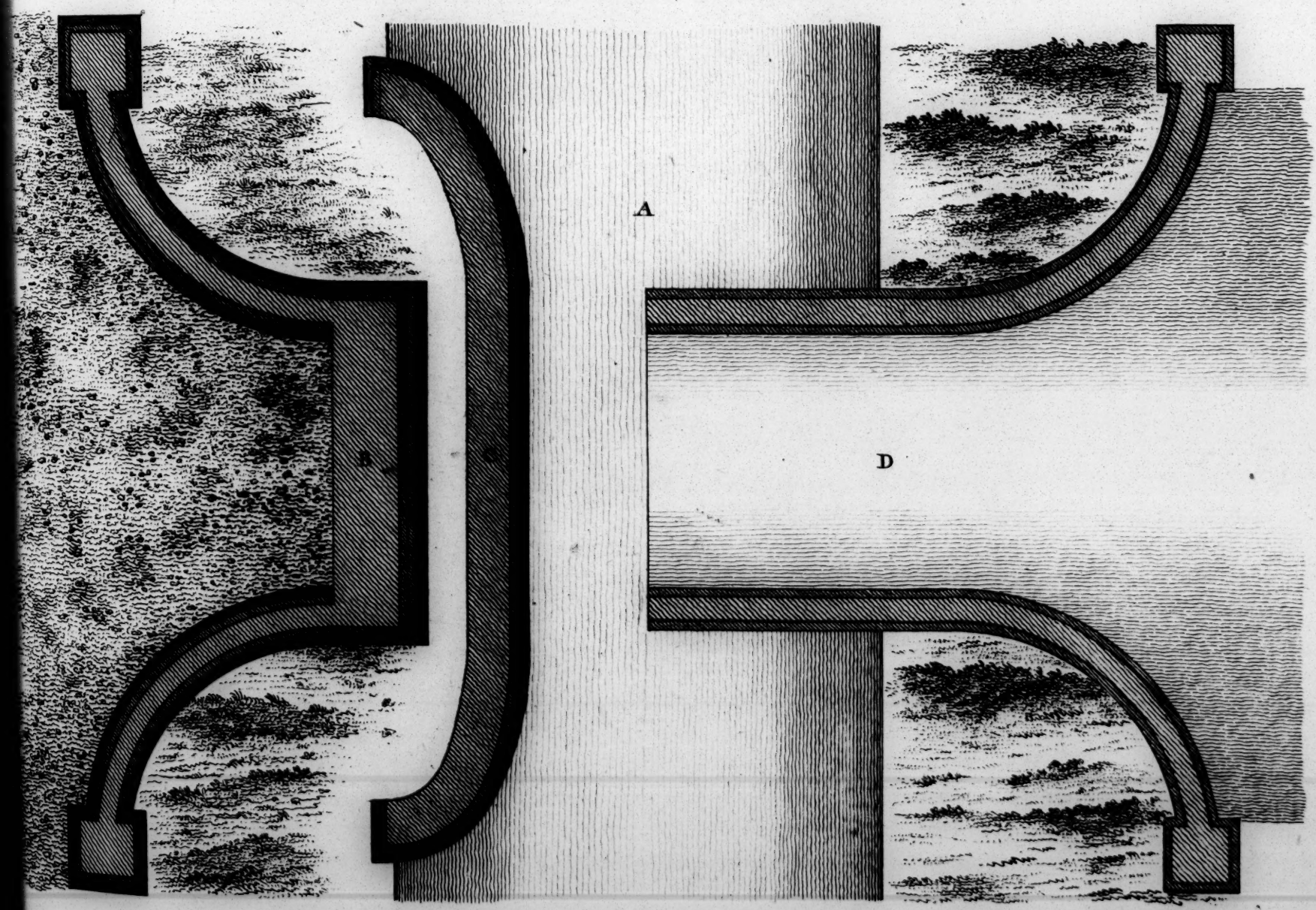
Plan of Foundation

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GR. III
BRITISH MUSEUM

Bridge for a Canal.

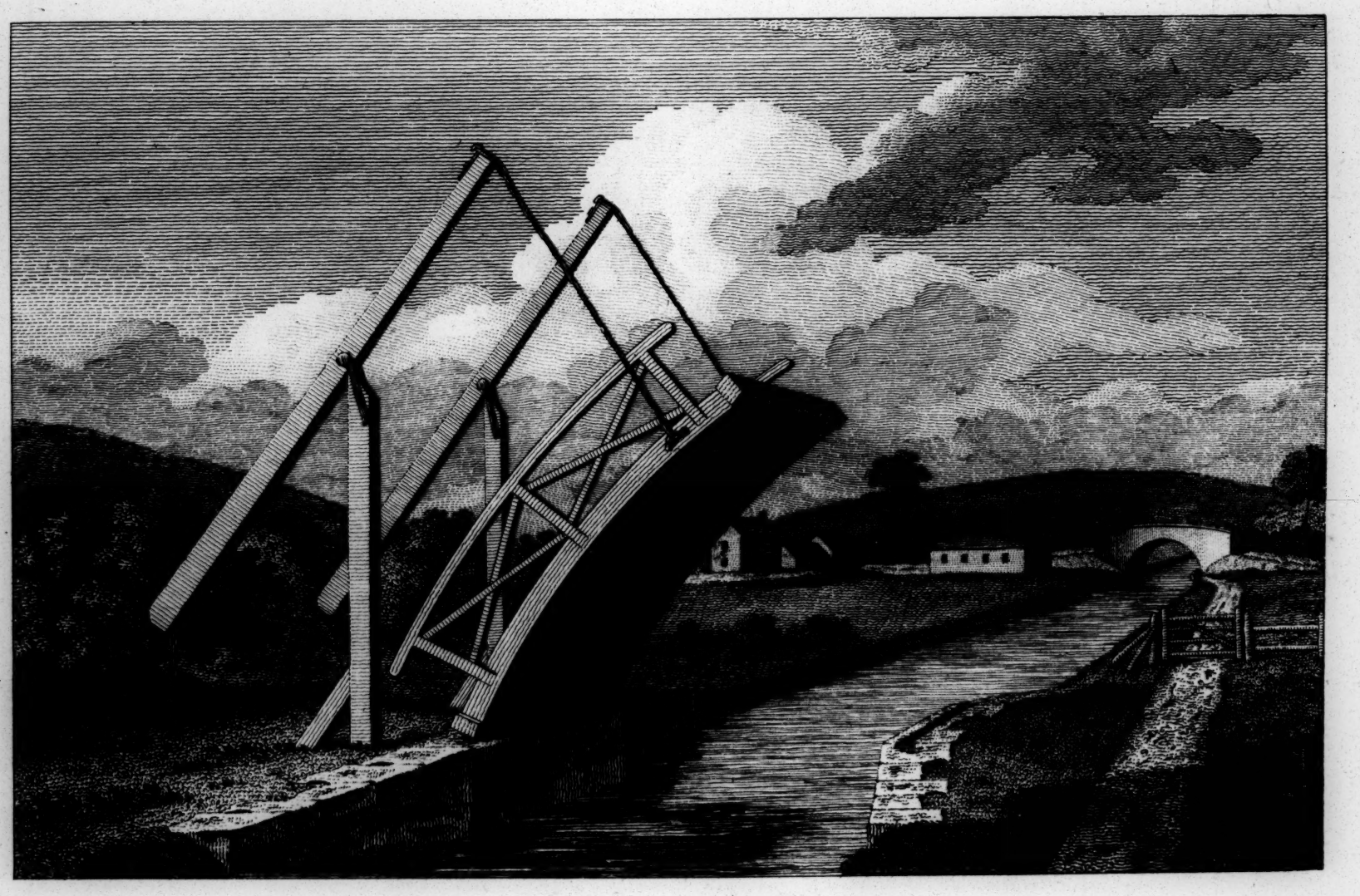




5 10 20 30 feet

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Accommodation Bridge for a Canal.

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GEORGIUS III
BRITISH MUSEUM

ADDENDA

TO THE

HISTORY OF INLAND NAVIGATION:

CONTAINING AN ACCOUNT OF THE

Hereford and Glouceſter Canal
Kington and Leominſter Canal
Worceſter and Birmingham Canal
Mancheſter Canal to Bolton and Bury
Leiceſter Navigation
Melton Mowbray Navigation
Arundel Navigation
Lewis Navigation
Monmouthſhire Canal
Coombe Hill Canal
Mancheſter and Oldham Canal
Wyrley and Eſſington Canal
Horncaſtle and Lincoln Navigation
Sleaford Navigation
Stover Canal
Sankey Canal
Loughborough Canal
Cromford Canal
Donnington-Wood Canal
Ketley Canal
Shropſhire Canal.

ADDENDA

TO THE

HISTORY OF INLAND NAVIGATION.

PRINTED IN 1793.

SOME articles in this Addenda were omitted in the body of the original work; this opportunity of giving them is embraced. The others have ariſen to maturity ſince the preceding ſheets were drawn up. To the aſſiſtance liberally communicated by the Gentlemen Engineers concerned in thoſe undertakings, my thanks are particularly due; as thereby the deſcriptions are more full and more accurate. I alſo ſolicit a continuance of friendly information and corrections, without which a work of this nature will be peculiarly liable to errors.

HEREFORD AND GLOUCESTER CANAL.

Hereford and Glouceſter Canal.

A Deſcription of the Canal from Hereford to Glouceſter, with a Collateral Cut to Newent. Joſ. Clowes, Engineer. Richard Hall, Surveyor. 1791.

IN 1791 an act of parliament was obtained for making the above canal, which has the following courſe.—Beginning at Hereford, it goes northerly, and croſſes the river Lugg, below Sutton St. Michael, and Sutton St. Nicholas; whence it purſues an eaſterly courſe, by Weſt-Hide, Cannon-Froome, Munſley; croſſes the river Leadon below Boſbury, and purſues a ſoutherly courſe, by Ledbury, Dinnington, to Dimmock; about two miles below Ledbury it again croſſes to the weſt ſide of the river Leadon: from Dimmock it purſues an eaſterly courſe for about four miles, and twice croſſes the river Leadon, and paſſes by Pauntley Upleadon, Newent (at three miles diſtance), Rudford, and Laſſington; again it croſſes the river Leadon, and a branch of the Severn; thence acroſs Alney Iſland, and into the Severn, oppoſite Glouceſter. The length and lockage are as follow:—From Widemarſh, near Hereford, to Withington-marſh, is ſix miles, and level. From thence to the beginning of the ſummit, near Monkhide, is three miles, with thirty feet riſe. The ſummit continues eight miles and a half, to Ledbury, and is level. From thence to Glouceſter eighteen miles, with a fall of one hundred and ninety-five feet ſeven inches—Making the total length to Hereford thirty-five miles five furlongs, with two hundred and twenty-five feet eight inches lockage. The collateral cut to Newent is three miles long, with a fall of ten feet to the junction. At the beginning of this canal, near Hereford, there is a tunnel of four hundred and forty yards; and another about the middle of the

ſummit, one thouſand three hundred and twenty yards long. The title of this body is, "The Company of Proprietors of the Herefordſhire and Glouceſterſhire Canal Navigation." The width of the canal, towing-paths, &c. is confined to fourteen yards, with a power of uſing all ſprings, &c. within three thouſand yards, with ſome exceptions. The expence is eſtimated at ſeventy-five thouſand pounds, with liberty to raiſe thirty thouſand pounds more, if wanting.

Hereford and Glouceſter Canal.

The rates to be collected are not to exceed—

For coal, two-pence per ton per mile.

For dung and other manure, bricks, lime-ſtone, and other ſtone (except block-ſtone), and clay, one penny per ton per mile.

For corn, grain, meal, &c. (except hops and wool), from Hereford, or from Ledbury to the junction with the Severn, three ſhillings and ſix-pence per ton.

For the ſame goods from any other part of the canal or collateral cut, to the Severn, two-pence halfpenny per ton per mile.

For corn, grain, meal, block-ſtone, hops, wool, &c. not ſpecified, three-pence per ton per mile.

Goods paſſing between Hereford and Ledbury pay tonnage for half a mile leſs than the actual diſtance.

The line of this canal will be very advantageous to the country through which it paſſes:—by it a communication will be opened for the collieries in the neighbourhood of Newent, and other tracts of land poſſeſſing large and valuable mines of coal, and with ſeveral lime-ſtone quarries; and not only the vicinity of Hereford, but the interior of South Wales, will be much benefited, as thereby a continued water-carriage may be had to the ſeveral ports of London, Briſtol, Liverpool, and Hull, to the great improvement of the value of lands and eſtates in the county of Hereford, &c.

Kington and Leominſter Canal.

KINGTON AND LEOMINSTER CANAL.

Deſcription of the Canal from Kington, in the County of Hereford, to the River Severn, near Stourport, in the County of Worceſter. Surveyed by Thomas Dadford, jun. 1789.

THE act of parliament for this canal was obtained in 1791. The canal has the following route.—Beginning at Kington, it purſues an eaſterly courſe, and paſſes by Stanton, Kingſland, where it croſſes the river Lugg, and makes a bend to Leominſter; from whence it turns, and goes between Eye and Berrington, by Orleton, Brimfield, where it croſſes the river Teme, by Little Hereford, Burford, Tenbury, Rochford, Knighton; there croſſes the river Rea, and proceeds to Lindridge, Low, Penſax, through a tunnel to Jones's Hole, and by Arley, there falling into the Severn, juſt above Stourport.

The length and lockage are as follow:

From Kington to near Stanton Park, a diſtance of near four miles, is level. From thence to Milton, two miles and a half, there is a fall of one hundred and fifty-two feet. From thence to near Kingſland is three miles and a half, having thirty-ſeven feet fall. From thence to Leominſter is four miles and a half, having ſixty-four feet fall. From Leominſter, at the diſtance of one mile and a half, there is a riſe of eighteen feet. From thence to the village of Wiſton is five miles and a quarter, and level. From thence to Letwich Brook is four miles and a half, with a fall of thirty-ſix feet. From Letwich Brook to the river Rea is near ſeven miles, and level. From thence to the tunnel at Soufnant is one mile, having a riſe of

thirty

thirty feet. From thence it is level near nine miles through the long tunnel at Penſax; from the eaſtern ſide of which, to the junction with the Severn, being a diſtance of rather more than three miles, there is a fall of two hundred and ſeven feet. The total length is rather more than forty-five miles; and the total lockage is five hundred and forty-four feet, viz. four hundred and ninety-ſix feet fall, and forty-eight feet riſe. On this canal are two tunnels; one near Souſnant, of one thouſand two hundred and fifty yards; the other at Penſax, of three thouſand eight hundred and fifty yards. Near Tenbury are two collateral cuts for the accommodation of certain mills.

Kington and Leominſter Canal.

The proprietors of this canal are incorporated under the title of "The Company of Proprietors of the Leominſter Canal Navigation." The ground allowed for the canal, towing-path, &c. is twenty-ſix yards, with a power of uſing all adventitious ſprings, &c. and thoſe within two thouſand yards—certain waters excepted. The money to be raiſed is one hundred and fifty thouſand pounds, with a power of raiſing forty thouſand pounds more if neceſſary.

The rates allowed are—

For timber, ſtone, marble, lime, limeſtone to be burnt for manure, iron-ſtone, raw materials, bricks, brick-tiles, ſlate, gravel, ſand, clay, manure, and rubbiſh, navigated between the Severn and Milton Croſs, near Stanton, three-halfpence per ton per mile, and from Milton Croſs to Kington three-pence per ton per mile.

For coke and charcoal, four-pence per ton per mile.

For all coal carried on any part of the canal between the river Rea and Leominſter, or between the river Teme and Leominſter, three ſhillings and four-pence per ton per mile.

For

Kington and Leominſter Canal.

For all coal brought on any part of the canal between the river Severn and the river Rea to Leominſter, or between the river Teme and Leominſter, the further ſum of eleven-pence per ton.

For all coals conveyed out of the Severn, and navigated to Leominſter, or between there and the river Teme, the additional ſum of one ſhilling and two-pence per ton, over and above the former rate of three ſhillings and four-pence.

For all coal navigated between Leominſter and Milton Croſs, two-pence halfpenny per ton per mile.

For all coal navigated between Milton Croſs and Kington, ſix-pence per ton per mile.

For all coal navigated on that part of the canal between the rivers Rea and Teme, two-pence halfpenny per ton per mile.

For all coal navigated eaſtward, between the rivers Rea and Severn, one ſhilling and nine-pence per ton.

For all coal navigated weſtward, between the rivers Severn and Rea, two-pence halfpenny per ton per mile.

For merchandiſe in general navigated between the Severn and Milton Croſs, two-pence halfpenny per ton per mile; and from Milton Croſs to Kington, ſix-pence per ton per mile.

Slack coal, navigated for the purpoſe of burning lime for manure, to pay but half the accuſtomed rates. Proprietors may lower the rates.

The advantages to be expected from the line of this canal are, an eaſy conveyance of coal, lime, and iron ore, thoſe neceſſary articles to huſbandry and manufactures, for which it may be expected the demand will be increaſed in proportion to the cheapneſs of carriage; whereby the working of the old quarries, &c. will be invigorated, and new ones opened; there being an eaſy conveyance by water to the ports of London, Briſtol, Hull, and Liverpool, including an immenſe tract of manufacturing country.

It

It is propoſed to introduce on this canal ſome inclined planes for the uſe of the navigation, which I ſincerely hope will anſwer the purpoſes propoſed, as they poſſeſs many advantages in ſituations where water is ſcarce, and their conſtruction is leſs expenſive than locks. Kington and Leominſter Canal.

WORCESTER AND BIRMINGHAM CANAL.

Worceſter and Birmingham Canal.

Deſcription of a Canal from Birmingham, in the County of Warwick, to the river Severn, near Worceſter, 1791.

THIS canal commences at Birmingham; from whence it takes a courſe through the pariſhes of Edgbaſton, Northfield, King's-norton, Alvechurch, Tardebig, Stoke-prior, Dodderhill, Hanbury, Hadſor, Himbleton, Oddingley, Tibberton, Hinlip, Warndon, Clains, St. Martin's, and, at Diglis, adjoining the ſouth ſide of Worceſter, falls into the Severn.

The length of this line is thirty-one miles and a half, of which the firſt ſixteen miles from Birmingham are upon a level; the remaining fifteen miles and a half have a fall of four hundred and forty-eight feet. The water for this canal is propoſed to be raiſed from the river Severn by fire engines, together with ſuch ſprings as may ariſe in making the ſaid canal. The Worceſter company are reſtrained from making a junction with the Birmingham and Fazeley canal; but the proprietors of that canal are not reſtrained from making the junction. This proceeds from the apprehenſion of the Birmingham canal loſing water. Indeed the Worceſter company appear very much diſtreſſed for water; and they are reſtricted from uſing nearly all the brooks which lay in the line.

The

Worceſter and Birmingham Canal.

The width of the canal, towing-paths, &c. is to be thirty yards. The company are allowed to raiſe one hundred and eighty thouſand pounds, and ſeventy thouſand pounds more, if the firſt ſum is not ſufficient.

The rates allowed to be taken are—

For coal, iron, iron-ſtone, ſtone, timber, &c. two ſhillings and ſixpence per ton, or three-pence per ton per mile, if navigated on the firſt ten miles only of the canal.

For lime and lime-ſtone ten-pence per ton, or one penny per ton per mile, if navigated on the firſt ten miles only of the canal.

Manure and materials for roads are exempted.

Boats under thirty-five tons are not to paſs locks without leave.

Compenſation is to be made by the Worceſter company to the Droitwich canal company, if their profits do not amount to five per cent. on each ſhare; and to the Stourbridge canal company, if their profits do not amount to nine pounds per cent. on each ſhare. Alſo, a compenſation to the Dudley extenſion canal, if their profits are decreaſed. Alſo, an annual compenſation to the water-bailiff of Worceſter, in lieu of his dues upon coals.

The completion of this canal will open a ſhorter communication for the extenſive manufactories of Birmingham with all the trading towns on the Briſtol channel; and, in return, will alſo afford to the goods of thoſe towns a certain conveyance to Liverpool, Hull, &c. The Wedneſbury coal alſo will have an eaſy carriage, as well along the whole line of the canal, as to many populous cities and towns which are below Worceſter on the banks of the Severn.

MANCHESTER

MANCHESTER CANAL TO BOLTON AND BURY.

Manchester Canal.

Deſcription of a Canal from Mancheſter to Bolton, with a Branch to Bury, in the County of Lancaſhire, 1791.

THIS canal commences on the north ſide of Mancheſter, and joins the river Irwell, with which it runs nearly parallel in its northerly courſe, and croſſes it above Clifton Hall, running by its ſide up to Bolton, in its way croſſing the river Roach, where alſo the branch goes for Bury, making the total length fifteen miles one furlong, with one hundred and eighty-ſeven feet riſe.

The proprietors of this canal are incorporated under the title of "The Company of Proprietors of the Canal Navigation from Mancheſter to Bolton and Bury." The ground allowed for this canal, towing-path, &c. is twenty-ſix yards; no water to be taken from the rivers Irwell and Lever. The money allowed to be raiſed is forty-ſeven thouſand pounds, and, if not ſufficient, twenty thouſand pounds more by mortgage or ſhares, &c. The rates to be levied are not to exceed as follow:

For lime, lime-ſtone, clay, bricks, ſtone, coals, &c. two-pence per ton per mile.

When the water flows over the lock Weir, lime and lime-ſtone ſhall pay only one halfpenny per ton per mile.

And further, coal, clay, bricks, or ſtones (except lime-ſtone), not paſſing through any locks, to pay only one halfpenny per ton per mile.

There are alſo regulations relative to the tonnage to be taken

Mancheſter Canal.

from the proprietors of the Merſey and Irwell navigations, if junctions are made, &c. &c.

This canal will open a cheap and eaſy communication, not only between the towns mentioned above, but alſo for the convenience of the intermediate country, which abounds with mines of coal, and other minerals, in great requeſt at the manufacturing town of Mancheſter, its various dependencies and connections.

LEICESTER NAVIGATION.

Leiceſter Navigation.

Deſcription of a navigable Communication between the Loughborough Canal and the Town of Leiceſter, with Rail-ways to Swannington, Coal Orton, Thringſton, Breedon, and Gracedieu, in the County of Leiceſter, 1791.

THIS canal commences at, and connects with the baſin of the Loughborough canal; paſſes on the north ſide of the town, and falls into the river Soar, at the village of Quorndon. Thus far is a new cut; the remainder is only improving the rivers with ſome occaſional cuts and deviations. From this union the river Soar is to be made and kept navigable for boats, barges, &c. to its junction with the river Wreak; which river is alſo to be made navigable to Turnwater meadow, in the pariſh of Coſſington: through this meadow, and the pariſhes of Syſton, Barkly, and Thurmaſton, there is (to avoid certain ſhallows) a cut which again falls into the Soar, which alſo is to be made navigable to Weſt-bridge, in the town of Leiceſter.

The rail-ways, &c. are as follow:—From Thringſton-bridge to Foreſt-lane, there is a water level, through the pariſhes of Oſgathorp,

Oſgathorp, Gracedieu, Belton, Sheepſhead, and Beaumanour; which level is alſo continued, by a rail-way, from Foreſt-lane to the baſin of the Loughborough canal. There are rail-ways to the water level, from Meſſrs. Raper and Fenton's coal-works, from Mr. Boultbee's and Mr. Burſlem's coal-works. From Thringſton-bridge another water level is to be made to the lime-works at Barrow-hill and Cloudhill, with rail-ways. Power is alſo given to the company to make other rail-ways connecting with the water levels, not exceeding two thouſand yards long. The reſervoir for the water levels is to be upon Charnwood-foreſt, between Goat houſe and Blackbrook bridge. Leiceſter Navigation.

The length and lockage are as follow:

From Thringſton-bridge to the Loughborough canal is about ſeven miles and a half, with one hundred and eighty-five feet fall. From the Loughborough canal to the junction with the river Soar is rather more than three miles, and level. From this junction to Leiceſter is eleven miles, with forty-five feet riſe.

This canal will croſs the Loughborough canal within about three hundred yards of its termination; for which, and other reaſons, the Leiceſter company guarantee to the Loughborough company three thouſand pounds per annum; for which guarantee, &c. they agree not to take more than eighteen-pence per ton, nor leſs than ten-pence per ton, for coal navigated from the Trent to Loughborough.

The breadth allowed for the canal, towing-paths, &c. is twenty yards. The company are authoriſed to raiſe forty-ſix thouſand pounds, and, if not ſufficient, twenty thouſand pounds more.

Leiceſter Navigation.

The allowed tonnage is as follows:

For coal from Loughborough to Leiceſter, fourteen-pence per ton. For any ſhorter diſtance, one penny per ton per mile.

But for coal paſſing to the river Wreak for Melton Mowbray, ſeven-pence per ton.

For timber, iron, &c. from Loughborough to Leiceſter, two ſhillings and ſix-pence per ton. For any ſhorter diſtance, two-pence per ton per mile.

For the ſame paſſing to the river Wreak, and Melton Mowbray, one ſhilling and three-pence per ton.

For lime, lime-ſtone, ſtones for building, and materials for roads, &c. one half of the above rates.

For coal conveyed on the rail-ways and water levels, from the ſeveral places to Loughborough, one penny per ton per mile.

For lime and lime-ſtone carried on the rail-ways, three-half-pence per ton per mile.

And for the ſame carried on the water levels, three farthings per ton per mile.

Commiſſioners may lower the tolls; in which caſe, goods paſſing to Melton Mowbray navigation are in no caſe to pay more than half the regulated tolls.

The powers of this act have been long wiſhed for, and ſought with much activity. Perſeverance has at laſt obtained the deſired object, which will open a cheap and ready conveyance for the produce of the mines, which ſo plentifully abound in the neighbourhood of Thringſton-bridge; tending not only to a vaſt improved value of thoſe eſtates, but alſo accommodating, at a cheap rate, a great extent of country with coal, lime, &c. paſſing one way into the river Trent with all its extents, the other way to the populous towns of Leiceſter and Melton Mowbray; from which

place

place new ſchemes are in agitation, of conſiderable extent, and of great uſefulneſs. Leiceſter Navigation.

LEICESTER NAVIGATION TO MELTON MOWBRAY.

Leiceſter Navigation to Melton Mowbray.

Particulars of an Act, &c. for making navigable the Rivers Wreak and Eye, from the Junction of the ſaid River Wreak with the Leiceſter Navigation at Turnwater Meadow, to Millcloſe Homeſtead, in the Pariſh of Melton Mowbray, in the County of Leiceſter, 1791.

THE act enables the proprietors to make the rivers Wreak and Eye navigable, from the junction at Turnwater Meadow to Melton Mowbray, by new cuts and deviations where neceſſary; and to cleanſe, ſcour, deepen, enlarge, alter, ſtraighten, &c.; to make new trenches or paſſages for water, in or upon the grounds adjoining. The breadth of new cuts and towing-paths is limited to twenty yards; and the towing-path on the ſide of the rivers to three yards, or ſix in crooked places. They are impowered to raiſe twenty-five thouſand pounds, and, if not ſufficient, five thouſand pounds more; to indemnify which, the company are allowed the following rates of tonnage:

For coal navigated from the Leiceſter navigation to Eye, Kettleby, Syſonby, or Melton, two ſhillings and ſix-pence per ton; for any ſhorter diſtance, two-pence halfpenny per ton per mile.

For iron, timber, &c. navigated from the Leiceſter navigation to Eye, Kettleby, Syſonby, or Melton, four ſhillings per ton; for any ſhorter diſtance, four-pence per ton per mile.

Dung, &c. manure, materials for repairing of roads, are exempted from tolls, under the ſame reſtriction as on the Leiceſter navigation.

This

Leiceſter Navigation.

This ſcheme for extending the inland navigation of this country, is but a continuation of the Leiceſter navigation before mentioned; the reſult of benefits muſt neceſſarily be nearly the ſame.

Arundel Navigation.

RIVER ROTHER.

ARUNDEL NAVIGATION.

Particulars of an Act "to enable the Earl of Egremont to make and maintain the River Rother navigable from the Town of Midhurſt to Stopham Meadow, and a navigable cut from the ſaid River to the River Arun, at or near Stopham-bridge, in the County of Suſſex." 1791.

THIS act impowers the noble Earl, his heirs, &c. to make and maintain the river Rother navigable for boats, barges, &c. from a piece of ground called the Lower Platt, near Midhurſt, through the ſeveral pariſhes of Woollavington, Eaſebourn, Amberſham, Selham, Lodſworth, Tillington, Burton, Duncton, Petworth, Sutton, Coates, Egdean, Fittleworth, Bury, Coldwaltham, and Stopham, to a certain piece of land called Stopham Meadow, and from hence to make a navigable cut to the river Arun near Stopham-bridge; and alſo to make another navigable cut from the river Rother, near Stopham-bridge, to Haſlingbourn-bridge, in the pariſh of Petworth. Power as uſual is given to cleanſe, ſcour, deepen, enlarge, &c. and to make towing-paths, &c. for which the following rates are allowed:

For chalk, ſoil or dung for manure, one penny per ton per mile.

For timber, plank, coals, lime, corn, grain, fire-wood, &c. three-pence per ton per mile.

Every exertion to render the inland navigation of this country more complete, deſerves much praiſe; and there can be no doubt

doubt but the patriotic undertaker of this ſcheme will not only materially benefit his own lands and eſtates, but receive the beſt of thanks from the neighbouring country, for ſo noble an exertion in the cauſe of their accommodation. Aru ndel Navigation.

RIVER OUSE.

Lewis Navigation.

LEWIS NAVIGATION.

Particulars of an Act, &c. for improving the Navigation of the River Ouſe, between Newhaven-bridge and Lewis-bridge, in the County of Suſſex; and for the better draining of the Low Lands lying in Lewis and Laughton Levels, in the ſaid County. 1791.

PREVIOUS to paſſing this act, the river between Newhaven-bridge and Lewis was navigable only for ſmall barges at particular times of tide; but, by widening, deepening, and ſome new cuts, it is propoſed to make the river conſtantly navigable for boats of larger burthen. It is intended ſo to deepen the river as at ordinary neap tides to admit veſſels drawing four feet water, up to Lewis-bridge; whereby, of courſe, the trade and commerce on the ſame will be much accommodated and increaſed. For this purpoſe the truſtees have extenſive powers to clean, ſcour, enlarge, widen, ſtraighten, &c. the ſaid river, and to make new cuts, and for this purpoſe may uſe the land adjoining, or within two thouſand yards of the river; may take ſoil, gravel, &c. for the purpoſe of embanking; and may throw or caſt ſoil, &c. on the adjoining grounds.

A great purpoſe intended alſo, is to drain certain lands lying to the eaſt of Lewis, called Laughton Levels; and this is intended to be done by embanking and ſtraightening the river up to Lewis-bridge, and at certain places higher up the river.

And,

Lewis Navigation.

And, for the purpoſes of this act, the truſtees are impowered to borrow money on the ſecurity of tolls and taxes, which tolls are as follow :

For beach, gravel, and all other materials to be uſed for the making or repairing of roads, three-pence per ton.

For chalk, lime, dung, mould, ſoil, compoſt, or other articles to be uſed for manuring of land, two-pence per ton.

For other goods, wares, and merchandiſes, four-pence per ton.

Theſe tolls are not to be reduced ſo long as the debts incurred by this act exceed ſix thouſand pounds, except thoſe on beach, gravel, &c. for the uſes of roads.

Veſſels, rafts, &c. paſſing or repaſſing between Lewis-bridge and Southerham Corner, are exempted from toll; alſo between Newhaven-bridge and Lock-hole.

By this act much of the neighbouring lands will be materially benefited by better drainage : as the embankments are to be continued on the eaſt ſide of the river, above Lewis-bridge, to a place called Buſhy Brook; and on the weſt ſide, above Lewis-bridge to the upper end of the new cut; and on the north ſide of Glynd Sewer, from Sound to the Swall Bank; and on the ſouth ſide, from Sound to a piece of land called the Cockfield, &c. &c. which lands are divided into five diviſions, and are liable to certain rates which are under the direction of the commiſſioners of ſewers. The lands below Newhaven-bridge are exempted from rates, and they are to maintain their own walls, &c.

MONMOUTH-

MONMOUTHSHIRE CANAL.

Monmouthshire Canal.

A Deſcription of the Courſe of a Canal from Newport to Pontnewyndd, with a Branch to Crumlin-bridge, and Rail-ways to Blaen-Aſon, Beaufort, Nant-y-glo, Sorwy, Troſnant, and Blaen-Dir Iron-works, in the Counties of Monmouth and Brecon. Surveyed by T. Dadford, jun. Engineer, 1792.

THIS canal commences on the weſt ſide of the town of Newport, having a baſin connected with the river Uſk; it paſſes between the town and the river, and croſſes the Chepſtow road: from thence, by Malpas, it purſues its route parallel to, and generally not very diſtant from the river Avon, by Ponty Pool to Pontnewyndd, being a courſe of near eleven miles, with a riſe of twelve feet in the firſt mile, viz. nearly oppoſite Malpas; the remaining ten miles have a riſe of four hundred and thirty-five feet: from nearly oppoſite Malpas a branch or canal takes its courſe parallel to the river Ebwy to near Crumlin-bridge, being a courſe of near eleven miles from the junction, with a riſe of three hundred and fifty-eight feet—Making the total length of the two canals twenty-two miles two chains, with eight hundred and five feet lockage.

From Pontnewyndd there is a rail-road alongſide the river Avon to the furnaces at Blaen-Aſon, being a diſtance of five miles and a quarter, with ſix hundred and ten feet riſe; and from Ponty Pool there is a rail-way to Troſnant Furnace of one mile long, with a branch to the furnaces at Blaen-Dir of half a mile: from Crumlin-bridge a rail-way is continued alongſide the river Ebwy, a branch of which it croſſes, after a continuance of three miles, with a riſe of one hundred and thirty-nine feet. This road is further continued alongſide the Ebwy Fawr river,

Monmouthſhire Canal.

by Ebwy Vale Furnace, to the iron-works at Beaufort, being a continuance of near ſeven miles, with four hundred and eighty feet riſe: from near the extremity of this road there is a branch to Sorwy Furnace, of one mile and a quarter. There is alſo another rail-way along the river called Ebwy Frach to Nant-y-glo, ſix miles and a quarter long, with a riſe of five hundred and eighteen feet. In this country theſe roads are, I think, generally made with ſtone.

The act for this canal was obtained in 1792, and by it the proprietors of the canal are ſtyled "The Company of Proprietors of the Monmouthſhire Canal Navigation." The ſeveral places receiving accommodations from this canal are already ſo particularly enumerated, that it is needleſs to enlarge more than to ſay—The act authoriſes the proprietors of the canal to make new rail-ways to any iron-works, lime-ſtone quarries, or coal-mines, within the diſtance of eight miles; the ſame may be done by owners of iron-works, &c. if the company refuſe.

The ground allowed for the width of this canal, towing-path, ditches, &c. is twenty-ſix yards, and the company are impowered to raiſe one hundred and twenty thouſand pounds, divided as uſual into one hundred pound ſhares, and ſixty thouſand pounds more if their firſt eſtimate is deficient.

The rates of tonnage on the canal are allowed as follow:

For iron-ſtone, iron ore, lead ore, coals, culm, ſtone-coal, coke, cinders, charcoal, lime (except intended for manure), tiles, bricks, lime-ſtone, flag-ſtones, and other ſtone, which ſhall be navigated or conveyed on the canal or rail-ways, two-pence half-penny per ton per mile.

For hay, ſtraw, corn in the ſtraw, materials for the repair of roads,

roads, lime intended for manure, and for all other kinds of manure, three-halfpence per ton per mile. Monmouthſhire Canal.

Veſſels laden as above not to paſs locks, unleſs the water flows over the waſte weir next above the lock, without conſent of the company.

For iron, lead, timber, and all other goods, wares, merchandiſe, &c. five-pence per ton per mile.

And, on the rail-ways, for every horſe, mule, or aſs, paſſing the toll-gates, one penny; and for cows, and horned or neat cattle, one halfpenny each.

Five per cent. of the clear profits of this undertaking is to be inveſted in government ſecurities, till the ſame ſhall amount to one thouſand pounds, as a fund for repairs. When the profits ſhall enable the company to ſhare ten per cent. the commiſſioners are impowered to reduce the tolls; the reduction to be firſt on coals. If, in conſequence of the reductions, ten per cent. cannot be divided, the tolls may be advanced. Boats under twenty tons are not to paſs locks without leave, or paying for that quantity.

Every advantage reſulting from canals in general may be expected from this in particular; no tract of country ſtood more in need of ſuch a conveyance, nor can any be more benefited by it. Here the bowels of the earth are loaded with precious minerals—hitherto unſought for, and little known, merely for the want of an eaſy conveyance to market. This once obtained, old mines will be explored, new ones diſcovered, and mother earth ranſacked for her hidden treaſures. Nor will the ſtately foreſts on her ſurface longer remain neglected; all muſt yield to the converting hand of induſtry. Poſſeſſions will receive a great increaſe in value, and the labourer find laſting food for his perſeverance on

Monmouthſhire Canal.

ores of iron and lead, ſtone and lime quarries, timber trees, &c. which, by ſo ready a conveyance to the Briſtol channel, will ſpread not only over England, but other parts of the world.

It is propoſed to uſe inclined planes on this canal, which I doubt not, from the abilities of the engineer employed in their conſtruction, will be made to anſwer well.

Coombe Hill Canal.

COOMBE HILL CANAL.

Deſcription of a Canal from the Foot of Coombe Hill, in the Pariſh of Leigh, in the County of Glouceſter, into the River Severn, at Fletcher's Leap. 1792.

THIS canal is in length only three miles and a half, with a fall of fifteen feet. It takes its name from the place where it commences, and joins the Severn at Fletcher's Leap, in the pariſh of Deerhurſt, and paſſes through the commons of Leigh and Deerhurſt.

The allowed tonnage for coal, iron, iron-ſtone, timber, &c. is two ſhillings and ſix-pence.

The canal is the property of three perſons only, viz. Thomas Burges, and William Miller, Eſqrs. and Mrs. Sarah Mumford. It was undertaken for the purpoſe of affording a cheap and ſhortened carriage from the Severn to Cheltenham;—the diſtance being, either from Glouceſter or Tewkſbury, nine miles; whereas from Combe-hill it is only four miles. There are alſo ſome extenſive collieries in that neighbourhood, which muſt be materially benefited.

MANCHESTER

MANCHESTER AND OLDHAM CANAL.

Mancheſter and Oldham Canal.

Deſcription of a Canal from Mancheſter to Aſhton-under-Lyne, and Oldham, in the County of Lancaſter. 1792.

THE canal commences on the eaſt ſide of Mancheſter, near a ſtreet called Piccadilly; croſſes the main road to Aſhton, and the river Medlock; paſſes Fairfield, and terminates at Aſhton-under-Lyne. At Fairfield the branch goes off to the New Mill near Oldham; from this branch there is a cut to Park Colliery. The total length is eleven miles, with one hundred and fifty-two feet riſe.

The ſubſcribers to this canal are incorporated under the title of "The Company of Proprietors of the Canal Navigation from Mancheſter to Aſhton-under-Lyne and Oldham." The breadth allowed for this canal, towing-path, &c. is thirty yards; and not to deviate more than one hundred yards from the line laid down;—are allowed to raiſe ſixty thouſand pounds, and, if not ſufficient, thirty thouſand pounds more. The rates to be as follow:

For lime, lime-ſtone, dung, manure, clay, ſand, and gravel, one halfpenny per ton per mile.

For coal, cannel, ſtone (except lime-ſtone), and other materials, not paſſing through locks, one penny per ton per mile.

For timber, goods, &c. not paſſing through locks, three halfpence per ton per mile.

For coal, cannel, ſtone (except limeſtone), and other materials, paſſing through locks, three-halfpence per ton per mile.

For timber, goods, &c. paſſing through locks, two-pence per ton per mile.

This

Manchester and Oldham Canal.

This canal and branches will ſupply the town of Mancheſter with coals and cannel (which are eſſential to the manufactures of Mancheſter), and alſo with ſtone; and will ſupply the country through which it paſſes, with lime and manure for the improvements of eſtates, &c.

Wyrley and Eſſington Canal.

WYRLEY AND ESSINGTON CANAL.

Deſcription of a Canal from Wyrley Bank, in the County of Stafford, to communicate with the Birmingham and Birmingham and Fazeley Canals near Wolverhampton, with Collateral Cuts to Stow Heath and Aſhmore Park. 1792.

THIS canal commences at a place called Wyrley Bank; paſſes through the Old Field, over Eſſington Wood and the Snead Commons, acroſs the road from Wednesfield to Bloxwich; from thence, on the ſouth ſide of Bloxwich, in a direct line to Birchill. From Snead Common the canal goes through Lane Head, near Perry Hall; from thence to Lapley Hayes, near the Moat Houſe, to Wednesfield, by Wednesfield Heath, and there joins the Birmingham canal. The branches are—one from near Wolverhampton to Stow Heath, another from the canal at Pool Hayes into Aſhmore Park, with another from Lapley Hayes into another part of Aſhmore Park.

The length of this canal I judge to be eight or nine miles; but not having a plan before me, am unable to give the exact meaſure, or the lockage.

The width of ground allowed for the canal, towing-path, &c. is twenty-ſix yards. The proprietors are impowered to raiſe for the works twenty-five thouſand pounds, and, if not ſufficient, twenty thouſand pounds more, by call or mortgage. The rates

of

of tonnage are not to exceed—For coal, coke, iron, iron-ſtone, lime, lime-ſtone, rock-ſtone, and other minerals, nine-pence per ton. For corn, grain, hops, timber, merchandiſe, &c. two-pence per ton per mile. Boats with leſs than twenty tons are not to paſs unleſs paid for twenty tons. Goods, coals, &c. paſſing this canal, and navigating on the Birmingham canal, and landed within one mile of the firſt lock, towards Autherly, pay to the Birmingham company two-pence per ton; and if the ſame paſs any of the locks towards the junction of the Staffordſhire canal, ſix-pence per ton. Wyrley and Eſſington Canal.

The intent of this canal is evidently to convey the produce of the mines in the neighbourhood of its ſource, at a cheap rate, to the ſeveral manufactories wanting thoſe articles.

HORNCASTLE AND LINCOLN NAVIGATION.

Horncaſtle and Lincoln Navigation.

Particulars of an Act of Parliament for improving the Tatterſhall Canal, and for making the River Bain navigable to Horncaſtle, in the County of Lincoln, and for rendering complete the Navigation of the River Witham. 1792.

THE act authoriſes the proprietors to purchaſe Meſſrs. Dyſon and Gibſon's intereſt in the Tatterſhall canal; to deepen, widen, and enlarge the ſame; and extend it to the river Bain, within the pariſh of Tatterſhall: alſo, to make the river Bain, and the ſtreams communicating therewith near the town of Horncaſtle, navigable to Horncaſtle, from the junction of the canal; and to make any new cuts on the ſides of the river, to ſtraighten the courſe of the river, and to avoid mills or other obſtructions. The breadth of the river, or cuts, towing-path, drains, fences, &c. is not to exceed twenty yards.

As

Horncaſtle and Lincoln Navigation.

As it is expected the trade of this navigation will cauſe a great increaſe of tonnage on the Witham river, goods which paſs from or to the Horncaſtle navigation, on the Witham river, are to pay but half the accuſtomed dues to the Witham company.

The proprietors are authoriſed to raiſe the ſum of fifteen thouſand pounds, to be divided into fifty pound ſhares, and ten thouſand pounds more if the firſt ſum is not ſufficient. The rates of tonnage are allowed as follow:

For goods, wares, merchandiſe, &c. navigated from above the ſeventh lock at Dalderby downwards, or from below to above the ſame lock, two ſhillings per ton.

For goods, &c. navigated from or to between the ſeventh and fourth lock, near Fulby Mill, one ſhilling and nine-pence per ton.

Goods, &c. navigated from or to below the fourth lock, one ſhilling and three-pence per ton.

For lime, limeſtone, manure, or materials for roads, half the above tolls.

When the profits from theſe tolls ariſe to a dividend of more than eight per cent. the tolls are to be lowered, reſerving a capital of one thouſand pounds for contingencies.

To make this chain of navigable communication complete at all ſeaſons, the act impowers the commiſſioners of the Witham river to make that river completely navigable through the High Bridge in the city of Lincoln, into the Foſdike canal.

The expences and charge of which improvements are to be borne and defrayed, for ſeven years, by the Witham company, and the two companies of the Sleaford and Horncaſtle navigations.

The completion of the purpoſes of this act will afford a deſirable navigation and conveyance for goods to the river Trent, to the great convenience and advantage of the county of Lincoln. Horncaſtle and Lincoln Navigation.

SLEAFORD NAVIGATION.

Particulars of an Act of Parliament for making and maintaining a Navigation from Sleaford Caſtle Cauſeway, to the River Witham, near Chappel Hill, in the County of Lincoln. 1792. Sleaford Navigation.

THE act authoriſes the proprietors to complete a navigation, and keep the ſame paſſable for reels, boats, &c. from the river Witham, near Chappel-hill, along the courſe of the river Kyme Eau, and Sleaford mill-ſtream, to New Sleaford, and Old Sleaford, through the ſouth bridge in Sleaford, and along the ſouth branch of the mill-ſtream, to the caſtle cauſeway. For this purpoſe they are impowered to deepen, widen, contract, &c. to make new cuts where neceſſary, ſo as to have the water eighteen feet wide at the bottom, thirty feet wide at the top, and four feet deep up to Haverholm-mill, and from thence to the caſtle cauſeway to be five feet deep; and they are allowed to have water from the fen lying above the head of the navigation, in the pariſhes of New Sleaford, &c.

The locks on the navigation are to be ſixty feet long, and fifteen feet wide in the clear. The tolls on the Witham river are to be reduced one half to goods paſſing on this navigation—the ſame as to the Horncaſtle company. The Witham tolls are to be equal, paſſing either to Lincoln, or to Boſton. The company are authoriſed to raiſe thirteen thouſand pounds, to be divided into one hundred pound ſhares; if the firſt ſum is not ſufficient, may raiſe ten thouſand pounds more.

Sleaford Navigation.

The allowed rates are not to exceed as follow:

For goods, wares, merchandiſe, &c. conveyed on any part between Haverholm-mill and Sleaford-cauſeway, or from above Haverholm-mill to the river Witham, two ſhillings per ton.

From any part between the ſaid mill and the ſecond lock, near Flax Dyke, to the river Witham, or any leſs diſtance below the ſecond lock, or from any diſtance below to between the ſaid ſecond lock and Haverholm-mill, one ſhilling and ſix-pence per ton.

From any part between the ſecond lock and Beffries-bridge to the river Witham, or any leſs diſtance, or from the river Witham, or any leſs diſtance, to between the ſaid bridge and ſecond lock, one ſhilling and three-pence per ton; and from any part between the ſaid bridge and the firſt lock in Kyme Eau, to the river Witham, or any leſs diſtance, or from the river Witham, or any leſs diſtance, to between the ſaid firſt lock and Beffries-bridge, one ſhilling per ton.

Lime, lime-ſtone, manure, or materials for roads, to pay only half the accuſtomed dues.

The profits or dividends are limited to eight per cent.; and when they exceed that ſum, after reſerving a fund of one thouſand pounds for contingencies, the tolls are to be reduced. The proprietors are incorporated under the title of "The Company of Proprietors of the Sleaford Navigation, in the County of Lincoln."

This year, 1792, an act of parliament was obtained for improving the navigation of the river Medway from Maidſtone to Aylesford-bridge; but as this is for mending an old navigation, not making a new one, I forbear giving the particulars.

STOVER CANAL.

Stover Canal.

Deſcription of a Canal from Teignmouth, in the County of Devon, to Chudleigh and Bovey Tracey, terminating at the Turnpike Road, five miles from Aſhburton. 1792.

THE length of this canal, from the tide-way of the river Teign, near Newton Abbots, is to Newton Buſhel one mile, and five miles and a half to Bovey Tracey, with a riſe of fifty feet. The ſame diſtance to Chudleigh, with a riſe of twenty feet; communicating in its courſe with a valuable coal-mine, and ſeveral valuable clay-pits. This canal commences at the navigable part of the river Teign, ſix miles from the port of Teignmouth, and terminates at the great road leading from Chudleigh to Aſhburton, towards which town, and others of ſome note, it is intended to be continued; by which, Morton and other parts will be ſupplied with manure at an eaſy expence, particularly lime and ſea ſand.

As this canal terminates within a few miles of the very extenſive foreſt of Dartmore, extending the canal to that uncultivated tract may be well worthy of conſideration; and if this idea ſhould be carried into execution, the whole of that barren and uncultivated diſtrict might be eaſily ſupplied with manure and all the requiſites to a cultivated and inhabited country; returning as back carriage, ſtone, minerals, grain, &c. to be ſhipped at Teignmouth for diſtant markets.

The extenſive importance of this canal is, I believe, inferior to none. By it the various potteries, not only of Staffordſhire, but the whole kingdom, are ſupplied with the moſt valuable clay for their manufactories, the demands for which are daily augmenting

Stover Canal.

ſince the ſpirited exertions of the proprietor of the canal has ſo much reduced the diſtance and rate of carriage; heretofore, not half the quantity wanted by the potteries could be obtained. By return of the clay ſhips, the whole country is well ſupplied with coals.

Another advantage attending the conſtruction of this canal, of no ſmall importance to land-owners or holders, is, the branches are ſo contrived that, with the ſuperfluous water, well mixed with the mud, the lands adjoining are floated; and I have the beſt information to ſay, this mode of irrigation has been attended with the moſt beneficial advantages to this active and noble ſpirited proprietor: this has been done under the direction of Mr. Gray of Exeter. Alſo, the great advantage attending plenty of manure at a cheap rate, has been ſo amply experienced by the neighbouring land-owners, that the proprietor has experienced the moſt ſatisfactory teſtimonies of having imparted a laſting benefit to his neighbours, who have all been forward to accommodate this undertaking; particularly Lord Courtney, who, with a liberality becoming his rank, has granted permiſſion for the canal to go through ſome extenſive grounds belonging to his lordſhip.

The whole of this canal, and nearly all the ground through which it paſſes, belongs to James Templer, Eſq; of Stover Lodge, Devon; has been executed at his entire charge; and is an example, of what may be achieved by an individual, who deems the proſperity of his neighbour, the advancement of commerce, and the good of his country—objects worthy his ſtudy and attention.

SANKEY

SANKEY CANAL.

Sankey Canal.

Deſcription of the Sankey Brook Canal, from St. Hellen's to the River Merſey. 1755.

THIS canal leads from the coal-pits at St. Hellen's, near Preſcot, to connect with Liverpool by the river Merſey, and was cut to convey coal for the accommodation of the latter place. Near this canal are the large copper-works belonging to the Angleſea company, and alſo the glaſs-works commonly called the Lancaſhire plate-glaſs-works. The length of the canal is twelve miles, with ninety feet fall. The act of parliament for making this canal was obtained in 1755, and impowers to render the brook called Sankey Brook navigable; but the advantages of a dead-water navigation was then underſtood ſo well as to lead the proprietors to make an entire new cut or canal by the ſide of the brook, totally diſregarding it, only for the purpoſe of ſupplying the canal with water. This canal, from its date, muſt be allowed precedence to the noble undertaking of the duke of Bridgewater in this line; the ſurveyor to it was Mr. John Eyes, in whoſe family there ſtill remains ſome of the plans, &c. and from which I am promiſed more particulars.

LOUGHBOROUGH CANAL.

Loughborough Canal.

Deſcription of the Navigation from the Trent, by the River Soar, &c. to Loughborough, in the County of Leiceſter. 1776.

THIS navigation commences with the junction of the rivers Soar and Trent. The act impowers the company to make the ſaid river Soar navigable to Biſhop's Meadow, in the liberty of Garenton, and from thence to make a navigable cut or canal to the Ruſhes at Loughborough.

The

Loughborough Canal.

The canal commences at the river Soar, a little below Gracedieu Brook, and takes a ſtraight courſe to a place called the Ruſhes at Loughborough; its length is about one mile, and level. This navigation has been found very beneficial by the inhabitants of Loughborough, as it cauſes a regular ſupply of coal at a cheap rate, and, by means of the river Soar, it enjoys an uninterrupted chain of connection with the river Trent, and by that river with all the various and important canals in the interior part of the kingdom; and by the late improved navigations, to Leiceſter, Melton Mowbray, &c. becomes of great utility.

Cromford Canal.

CROMFORD CANAL TO LANGLEY BRIDGE.

Deſcription of the Canal from Cromford to the Erwaſh Canal at Langley Bridge, in the County of Derby.

THIS canal begins at Cromford, runs ſome way parallel with the river Derwent, and paſſes Critch Frithley, Tod Moor, Heage, Hartey, Leſcoe, Heynor, and joins the Erwaſh canal at Langley-bridge, which canal falls into the Trent near Nottingham.

The total length from Cromford to the junction is about fourteen miles, of which the firſt eleven are level, and the latter three, towards the junction, have a fall of about eighty feet. There is a collateral cut to ſome coal-works, of three miles, and level; beſides ſeveral ſmall tunnels, there is one on this canal of about three thouſand yards long. This canal is of great ſervice to mines of coal, &c. which abound in the whole of its vicinity.

DONNINGTON-WOOD CANAL.

Donnington Wood Canal.

THIS canal, the private property of the Marquis of Stafford and Thomas and John Gilberts, Eſquires, was made about twenty years ago—the length is ſix miles, and level. It begins at Donnington-wood iron-works, in the pariſh of Lilliſhall, and proceeds to Paved Line near Newport, all in the county of Shropſhire: is uſed principally for conveying iron-ſtone, lime-ſtone, and other raw materials, to the iron-works at Donnington-wood.

The boats navigated are of twenty-five tons burthen.

KETLEY CANAL.

Ketley Canal.

Particulars of a Canal made in 1789, *from Ketley Iron-Works, in Shropſhire, to the Shropſhire Canal.*

THIS canal is the private property of Meſſrs. W. Reynolds, and Company. It commences at the Shropſhire canal, at a place called Oaken Gates, and proceeds to the iron-works at Ketley, of which Meſſrs. Reynolds and Company are owners. The length of the canal is one mile and a half, with a fall of ſixty-ſeven feet to Ketley; which is managed by a ſmall lock of one foot lift, and an inclined plane ſixty-ſix feet perpendicular height. It is proper here to ſay, this machine is the firſt conſtructed for uſe in England, and anſwers all the purpoſes intended exceedingly well, the loaded boats drawing up the empty ones. Much merit is certainly due to the perſon who firſt, by experience, ſhews not only the practicability, but alſo the eligibility of an unuſual machine; it is but juſtice thus to record the introduction of ſo economical a contrivance. To this canal there muſt have been ſeven or eight locks, which would have coſt a great ſum of

Ketley Canal.

money; and water for their ſupply would perhaps have coſt more, for at this time water is ſo valuable, that what neceſſarily paſſes into the lower canal as boats are let down, is reſerved in a well, and thrown back again by a ſmall fire-engine: indeed the conſtruction of this ſhort canal ſhews evident marks of a liberal and ſuperior genius.

The principal uſe of the canal is to convey coal, iron-ſtone, and raw materials, to the Ketley iron-works—The boats carry about eight tons.

Shropſhire Canal.

SHROPSHIRE CANAL.

A Deſcription of a Canal from the Donnington-Wood Canal in Shropſhire, to the River Severn.

THE act of parliament for this canal was obtained in 1788. It has the following courſe: Beginning from the canal at Donnington-wood, in the pariſh of Lilliſhall, by Rockwardine Wood, Oaken Gates, Hollingſwood, Stirchley, Madeley, the Hay, and into the Severn, at a place called the Sheep-waſh Meadow, two miles below Coalbrooke Dale. The length is ſeven miles and a half; the riſe and fall is four hundred and fifty-ſeven feet: the whole of which is managed by three inclined planes:—the firſt, at the northern extremity at Donnington-wood, is a perpendicular height of one hundred and twenty-two feet aſcent; the length of the declivity is three hundred and twenty yards:—the ſecond, at Stirchley, is a perpendicular height of one hundred and twenty-ſix feet deſcent; the length of the declivity is five hundred and eighty-ſix yards:—the third, at the Hay, is a perpendicular height of two hundred and ſeven feet deſcent; the length of the declivity is three hundred yards. The machinery to the inclined planes is worked by a ſteam-engine. If it ſhould have

been ſaid the inclined plane on the Ketley canal was on a ſmall ſcale, thoſe on this canal are ſufficiently large to juſtify a more general adoption of an invention ſo uſeful and economical. Shropſhire Canal.

There is a branch or collateral cut from this canal, at Southwell Bank, near Strichley, which goes by Dawley and Lightmoore, to the head of Coalbrooke Dale. From the termination, the cargoes are lowered through perpendicular tunnels or ſhafts ten feet diameter, and one hundred and twenty feet deep, to the rail-ways below, which lead to Coalbrooke Dale iron-works, and the river Severn at Load Croft, and other wharfs in that neighbourhood: alſo, from the iron-works at Horſe Hay, there is a rail-way which communicates with this canal.

The proprietors of this canal are incorporated under the title of "The Company of Proprietors of the Shropſhire Navigation;" and are allowed the following tonnage:

For iron, iron-ſtone, coal, ſtones, timber, goods, merchandiſe, &c. two-pence per ton per mile.

The boats carry about eight tons.

This canal, with its connections, is particularly uſeful in conveying the raw materials to the many large works and furnaces in the vicinity, and for conveying their manufactured articles to the ſeveral wharfs on its borders, and to the Severn, by which river they are diſperſed to parts wide and diſtant. The country is alſo much accommodated with merchandiſe in general, at a cheap tonnage. 5

FINIS.

SECOND ADDENDA

TO THE

HISTORY OF INLAND NAVIGATION;

CONTAINING

ACCOUNTS OF THE SEVERAL CANALS,

For which Acts have been obtained in the two laſt Seſſions of Parliament;

AND WHICH COMPLETES

THE HISTORY TO THAT PERIOD.

ADVERTISEMENT.

EXPERIENCE having confirmed the many and great advantages arising from canal navigations, in a commercial country, which united to the increased state of the Manufactures and Trade of this country, have tended to bring to maturity, within the last two years, Acts of Parliament for thirty-six abſolutely new schemes for canals; which with other

other bills for extending and amending sundry rivers, &c. make forty-seven Acts of Parliament in that period relative to the inland navigation of this country. It has therefore become necessary and incumbent on us, to make a further Supplement to our History, of such undertakings; which, after considerable exertions of industry, aided by the general liberality of the Gentlemen concerned in them, we are enabled to lay before our readers with very respectable accuracy; the whole having been made out, from the several plans and documents laid before Parliament; and as no variation of any consequence, can take place without leave of Parliament, there appears no necessity to enlarge on the accuracy or competency of such assistance. Our new arrangement also, will be found pleasant and convenient.

It is worthy of observation, that the great sum of money engaged in this kind of concern, within the last two years, is immense; the capitals allowed to be raised for the uses of these acts, exceeds 5,300,000l. a most enormous sum! And yet, the more it is contemplated the better it appears; one part, and that not the least pleasing is, that the whole amount, without any exception, will be expended within our own country, and among our own countrymen; and by much the greater part circulated among the laborious and industrious poor: many of whom, must of necessity, be constantly engaged in maintaining and attending upon these various works, and their extensive concerns. In another point of view, also, the prospect is pleasing, for from so great a capital laid out within the country, great profits must ultimately arise to our Artisans, and to our Merchants, and to the whole of those Countries, through which these means of conveyance pass.

Inland navigation is now proved to be a nursery to our Navy; this we pointed out in the Preface to the History, but were not then aware, the theory might so soon be verified by experiment: we cannot think this instance of the general benefits arising from inland navigations, either trifling or unimportant; viewing as we do, the safety and prosperity of our favoured Isle, with the ardour and anxiety of true Britons.

SECOND ADDENDA

TO THE

HISTORY OF INLAND NAVIGATION.

PRINTED IN 1794.

ABERDARE CANAL.

Aberdare Canal.

An Account of a Canal from the Glamorganſhire Canal to the Village of Aberdare in the County of Glamorgan, with a Rail road from thence to join the Neath Canal at Abernant. J. Dadford, Engineer. 33 *Geo. III. Ch.* 95.

THE canal joins the Glamorgan canal juſt at the fork made by the union of the river Cynon with the river Taff, and proceeds through a beautifully wild country, parallel with the Cynon to Aberdare, a diſtance of ſeven miles and a half, with a riſe of forty feet in the latter three miles to Aberdare; the firſt part is level. From Aberdare there is a rail road which croſſes the river Cynon at Aberdare, and taking a weſterly courſe joins the Neath canal at Abernant, being a diſtance of eight miles and a half.

Aberdare Canal.

The proprietors of this undertaking are incorporated under the name of "The Company of Proprietors of the *Aberdare Canal* Navigation." And have the neceſſary powers for making the ſame, allowing the ground for the breadth of the canal, towing-path, &c. to be twenty-ſix yards. They are to make a lock ſufficient to prevent the flood waters from this canal injuring the Glamorgan canal.

The company are authoriſed to raiſe the ſum of 22,500l. to be divided into ſhares of 100l. each, and a further ſum of 11,000l. if the former ſum is not ſufficient. They are allowed to demand the following *rates of tonnage*, for carrying on the canal and rail roads—

For all iron, timber, goods, wares, merchandiſe, &c. *five-pence* per ton per mile, and ſo in proportion for leſs than a ton, or leſs than a mile.

For all iron-ſtone, iron-ore, coal, coak, charcoal, bricks, brick-tile, and ſlate, *two-pence* per ton per mile.

For all lime-ſtone, building-ſtone, ſtone, tile, lime, ſand, clay, and all kinds of manure, *three halfpence* per ton per mile.

For all cattle, ſheep, ſwine, and other beaſts, *five-pence* per ton per mile.

Fractions to be taken, as for a quarter of a ton, and as for a quarter of a mile.

Alſo for *traveling* on the rail ways—

For every horſe, mule, or aſs, *one-penny* per day.

For all cows, and all other cattle, *one-halfpenny* each.

For all ſheep, ſwine, and calves, *five-pence* per ſcore.

For articles remaining on *wharf* more than two months, a reaſonable allowance ſhall be made.

Exemption

Aberdare Canal.

Exemption from Rate. Owners and occupiers of adjoining land, may navigate huſbandry boats meaſuring not more than five feet wide, and twelve feet long, for the purpoſe of conveying cattle, but not for ſale, and not to paſs any lock without leave.

The undertaking of this canal may be conſidered as an evidence of the advantages already derived from ſimilar ſpeculations, in this part of the kingdom: proprietors at laſt, are awakened to a ſenſe of the due value of the great treaſures it poſſeſſes; and are emulous by multiplying canal navigations, to bring them to light, as well for their own profit, as the advantage of the world at large.

BARNSLEY CANAL.

Barnſley Canal.

An Account of a Canal from the River Calder, near Wakefield, to Barnſley, and Barnby Bridge, in the Weſt Riding of the County of York. 33 *Geo. III. Ch.* 110.

THIS canal joins the river Calder below the town of Wakefield, and paſſes Croſton, Felkirk, Royſton, and arrives at Barnſley, whence it makes a bend to Barnby Bridge, near the town of Cawthorn, the length about fourteen miles. There are ſeveral rail ways to the canal from Barnſley, and others from Barnby Bridge. The fall from the junction with the Dearne and Dove canal, is one hundred and twenty feet to the river Calder.

The proprietors are incorporated under the name of "The Company of the Proprietors of the *Barnſley Canal* Navigation," with

Barnſley Canal.

with the neceſſary powers for making the canal, &c. The breadth of the ground allowed for the canal, towing-path, &c. is twenty-four yards; not to deviate more than one hundred yards from the line laid down in the book of reference in making the canal, nor more than twenty yards in making the rail ways. The rubbiſh, &c. dug in making the canal, is to be leveled on the adjoining ground in a proper manner.

The proprietors are authoriſed to raiſe the ſum of 72,000l. to be divided into ſhares of 100l. each, a further ſum of 25,000l. may be raiſed if neceſſary, no perſon to have more than ten votes.

The allowed *rates of tonnage* are—

For every quarter of wheat, ſhelling beans, peas, vetches, and lentils, rape, line, cole, muſtard ſeed, apples, pears, onions, and potatoes, carried the whole length of the canal, and in the ſame proportion for any leſs diſtance, *ſix-pence*.

For every quarter of barley, carried the whole length of the canal, and ſo in proportion, *five-pence*.

For every quarter of oats or malt, carried the whole length of the canal, and ſo in proportion, *four-pence*.

For every pack or ſheet of wool, dried pelts, or ſpetches, carried the whole length of the canal, and ſo in proportion for any leſs weight, or any leſs diſtance, *ſix-pence*.

For every ton of coal, ſleck, cinders, culm, and charcoal, per mile, *one-penny*.

For every ton of lime, per mile, *one-penny*.

For every ton of limeſtone, per mile, *three-farthings*.

But if it ſhall happen that boats or veſſels which carry up either of the two laſt articles, *videlicet*, lime or limeſtone, return loaded with coals, or any other articles, amounting to thirty

thirty tons or more in each boat or veſſel, then ſuch boat to be rated or charged, lime, per ton per mile, *three-farthings*; limeſtone, per ton per mile, *one-halfpenny*. Barnſley Canal.

For every ton of ſtone, iron-ſtone, flag paving-ſtone, and ſlate, per mile, *one-penny*.

But in caſe the boats and veſſels which carry up theſe articles come down loaded as thoſe mentioned carrying up lime and limeſtone, then to be charged, per ton per mile, *three farthings*.

For every ton of old or pig-iron, per mile, *one-penny halfpenny*.

For every ton of caſt metal goods, ready for the purpoſe for which they are intended, and bar-iron, per mile, *two-pence*.

For every ton of oak, elm, aſh, fir, deals, and battens, per mile, *one-penny halfpenny*.

And for every ton of groceries of all kinds, linen and woolen yarn, cotton, flax, hemp, manufactured goods of all ſorts, with every other kind of goods, wares, merchandize, commodities, and things whatſoever, per mile, *two-pence*.

For every ton of coals, &c. carried on the rail ways, *threepence*, per mile.

For every ton of coals, &c. carried on any ſtoned road, *one-penny halfpenny*, per mile.

Owners and occupiers of adjoining lands are not liable to pay rates for their neceſſary and cuſtomary paſſing on the roads.

Exemption from rates, all dung, ſoil, marle, aſhes of coal, and turf, and all other manure (except lime) for the improvement only of adjoining lands. All materials for making and repairing any public or private roads (except flag-ſtones, curb-ſtones, or cauſeway-ſtones) under the uſual reſtrictions.

The rates of *wharfage* are as follow

For

ADDENDA.

Rates of Wharfage.	More than 24 Hours, not more than Six Days.	Six Days, but leſs than One Month.	One Month, but leſs than Six Weeks.	Six Weeks, but leſs than Two Months.	Two Months, but leſs than Ten Weeks.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
For every Ton of Goods, Wares, Merchandize, Commodities, and other things (except what are herein-after enumerated) - - - - -	0 0 6	0 0 9	0 1 0	0 1 3	0 1 6
For every Ton of *Engliſh* Timber of all Kinds, and Pig and Bar Iron - - - - -	0 0 3	0 0 6	0 0 9	0 1 0	0 1 3
For every Ton of Coals, Stone, Iron Stone, Lime Stone, Flint, Clay, and Sand - - - -	0 0 0½	0 0 1	0 0 1½	0 0 2	0 0 2½
For every Ton of Lime, Bricks, Tiles, Plaiſter, and Soaper's Aſhes - - - - -	0 0 1	0 0 2	0 0 3	0 0 4	0 0 5
For every Quarter of Corn of all Kinds, Cole, Rape, Line and Muſtard Seed, Apples, Pears, Onions, and Potatoes - - - - -	0 0 0½	0 0 1	0 0 1½	0 0 2	0 0 2½

And ſo in Proportion for any longer Space of Time any ſuch Goods, Wares, Merchandize, Commodities, and other Things, ſhall lay upon or within any Wharf, Straith, or Warehouſe.

Whatever

Barnſley Canal.

Whatever veſſels ſhall paſs from the Dearne and Dove canal into this canal empty, not intending to return with a lading, the ſame ſhall be charged *three-halfpence*, per ton, for thirty tons, for the whole diſtance from the junction, to the Calder; and the ſame if coming from the Calder empty, &c. A lock to be erected and maintained at the junction of this and the Dearne and Dove canal, to prevent loſs of water to either; and if the water is not kept of equal level in both canals, the paſſage may be ſtoped. Stopgates are to be erected on this canal, below the branch to Barnby Bridge, in order that there may be an uninterrupted navigation between that place and the Dearne and Dove canal.

The canal and locks, are to be of ſuch dimenſions, as ſhall accommodate the boats uſually navigated on the rivers Calder and Dunn.

Veſſels under thirty tons, not to paſs any lock without leave, or paying that tonnage.

No water to be taken for this canal from the rivers Dunn and Dearne, or from any of the ſprings, &c. which ſupply them. Nor from any ſprings which ſupply bleaching grounds in the vicinity.

If a junction is made from the Calder and Hebble navigation with this canal, at or near Bargh Mill; all rail ways, ſtone roads, &c. to the northward of Bargh Mill, ſhall ceaſe and be diſcontinued.

In order to prevent the inconveniences, which might ariſe to the inhabitants of Warmfield, from the ſmoke of the ſtem-

engine

Barnſley Canal.

engine, intended to be erected on Heath Common, for the purpoſe of ſupplying the canal with water; the ſaid engine is to be conſtructed ſo, that in working the ſaid engine, the ſmoke may be burnt or conſumed.

Baſingſtoke Canal.

BASINGSTOKE CANAL.

THE Act paſſed this Seſſion, enables the proprietors to raiſe either by loan, or by annuities, 60,000l. in addition to the 126,000l. before raiſed. 33 Geo. III.

Brecknock Canal.

BRECKNOCK CANAL.

An Account of a Canal from the Town of Brecknock to the Monmouthſhire Canal, near Ponty-Pool. T. Dadford, jun. Engineer. 33 *Geo III. Ch.* 96.

THIS canal joins the Monmouthſhire canal, eight miles and a half from Newport, and about one from Ponty Pool, it croſſes the river Avon, where it paſſes the high ground by means of a tunnel, two hundred and twenty yards long, and inclining towards the river Uſk, paſſes Abergavenny; it then runs parallel with the Uſk to the town of Brecknock; making a courſe of near thirty-three miles, with ſixty-eight feet riſe to Brecon. From the junction to Abergavenny is eleven miles, and level; the level continues three miles further. From whence to Brecon is eighteen miles and a half, with ſixty-eight feet riſe. There is a rail road from Abergavenny to the canal. one mile long; and from the canal at Cwm Clydack

to

to the coal and iron works at Wain Dew, which is four miles and three quarters long. There is alſo a rail road from the canal to Llangroiney, which croſſes the river Uſk, and is in length one mile and a quarter. Brecknock Canal.

The proprietors of this canal are incorporated by the name of " The Company of Proprietors of the *Brecknock and Abergavenny Canal* Navigation," with the powers neceſſary for making the canal, rail ways, &c. The breadth of ground allowed for the canal, towing-path, &c. is twenty-ſix yards; and are not to deviate more than two hundred yards from the line laid down in the book of references.

The company are authoriſed to raiſe the ſum of 100,000l. to be divided into ſhares of 100l. each, no perſon to hold more than fifty ſhares, unleſs the ſurplus come by will, &c. if the above ſum is not ſufficient, the company may raiſe a further ſum of 50,000l.

The Rates for the uſe of the canal and rail ways are not to exceed—

For all iron-ſtone, iron-ore, lead-ore, coals, culm, coaks, cinders, and charcoal, *two-pence* per ton per mile.

For all lime, lime-ſtone, tiles, ſlate, bricks, flag-ſtones, and other ſtones, clay, ſand, hay, ſtraw, and corn in the ſtraw, and all materials for the repairs of roads, and all kinds of manure, *one-penny* per ton per mile.

For all cattle, ſheep, ſwine, and other beaſts, *four-pence* per ton per mile.

For all iron and lead, *three-pence* per ton per mile.

Brecknock Canal.

For all timber, goods, wares, merchandiſe, &c. *four-pence* per ton per mile.

Fractions to be divided into quarter of a ton, and half a mile.

Veſſels laden with hay, ſtraw, corn in the ſtraw, materials for the repair of roads, and manures, not to paſs any lock, unleſs the water ſhall flow over the waſte wire, without conſent.

Exemption from Rates. Owners and occupiers, may navigate huſbandry boats not exceeding five feet in breadth, and twelve feet in length, for the purpoſes of removing cattle, manure, &c. (except lime) provided the ſame are not for ſale, and do not paſs any lock.

For *traveling* on the rail roads—

For every horſe, mule, or aſs, *one-penny* each.

For all cows, and other cattle, *one halfpenny* each.

For all ſheep, ſwine, and calves, *five-pence* per ſcore.

And for goods remaining on *wharfs* more than forty-eight hours, a reaſonable ſatisfaction ſhall be made.

Boats under twenty tons lading, are not to paſs any lock without leave, or paying for that quantity.

In conſideration of the great advantages which the Monmouth canal company will derive from this canal, they have agreed to pay to the Brecon company, the ſum of 3000l. on the 25th day of March, 1794. They have alſo agreed not to take for any goods, &c. which ſhall be navigated on the Brecon canal a greater tonnage than that company takes, and never to exceed the rates allowed to the Monmouth canal company; for which ſee our former Appendix page 18.

As

As this canal may be conſidered an extenſion of the Monmouthſhire canal, ſimilar advantages may be expected to reſult from this undertaking, through a county equally abounding with minerals, ores, &c. the precious produce of which will now find their way to diſtant markets, upon very advantageous terms. Brecknock Canal.

CAISTOR CANAL.

Caiſtor Canal.

An Account of a Canal from the River Ancholme, at South Kelſey, to the town of Caiſtor, in Lincolnſhire. 33 *Geo. III. Ch.* 114.

THIS canal joins the river Ancholme, in the pariſh of South Kelſey; and proceeds in a direct courſe to the town of Caiſtor, being a diſtance of about nine miles.

The proprietors are incorporated by the name of "The Company of Proprietors of the *Caiſtor Canal* Navigation, in the county of Lincoln;" with the cuſtomary powers. The land allowed for the canal, towing-path, &c. is twenty-two yards in breadth. The company are empowered to raiſe the ſum of 15,000l. to be divided into ſhares of 100l. each, a further ſum of 10,000l. may be raiſed if neceſſary. The ſhares to be numbered, and tickets for each given, on payment to the clerk, of two ſhillings.

The following *rates of tonnage* are allowed to be taken—

For every quarter of wheat, rye, ſhelling beans, peaſe, vetches, lintels, apples, pears, onions, and potatoes, *three halfpence* per mile.

Caiſtor Canal.

For every quarter of barley, malt, and oats, *one-penny* per mile.

For every pack or ſheet of wool, dried pelts, or ſpetches, *three halfpence* per mile.

For coal, ſleck, cinders, culm, and charcoal, *four-pence* per ton per mile.

For lime, *three-pence* per ton per mile.

For bricks, and tiles, *two-pence* per ton per mile.

For ſtone-flag, paving-ſtone, and ſlate, *three-pence* per ton per mile.

For caſt metal goods, ready for uſe, except cleaning and putting together; bar, and other iron, *ſix-pence* per ton per mile.

For all timber, Engliſh or foreign, deals, &c. *four-pence* per ton per mile.

For all groceries, linen and woolen yarn, cotton, flax, hemp, manufactured goods, all wares, merchandiſe, &c. *eight-pence* per ton per mile.

Fractions to be taken, as for a mile, and a quarter of a ton.

For goods remaining on *wharf* more than forty-eight hours a reaſonable allowance ſhall be made.

Exemption from Rates. Officers, or ſoldiers on their march, with their horſes, arms, baggage, &c. timber, or ſtores for the uſe of his majeſty. All gravel, ſand, &c. for making, or repairing public roads; alſo dung, marle, ſoil, &c. for the purpoſe of manuring lands belonging to owners of adjoining land; the ſame not to paſs any lock, unleſs the water ſhall flow over the waſte wire.

Veſſels under twenty tons, are not to paſs any lock without leave, or paying for that tonnage.

The uſes of this canal are chiefly local, but ſhew the public begin to underſtand that water carriage, is more advantageous than land carriage. Caiſtor Canal.

CHELMER AND BLACKWATER NAVIGATION. Chelmer and Blackwater Navigation.

Particulars of an Act for making a Navigable Communication between the Town of Chelmsford and the River Black Water, near Maldon. 33 *Geo. III. Ch.* 93. *John Rennie, Engineer.*

THE intent of this Act is to render the river Chelmer navigable by widening, deepening, &c. and making new cuts where neceſſary, which is intended to be done, as far as Beely Mill near Maldon, where by means of a cut the navigation leaves the river Chelmer, and croſſes into the river Black-water, and down which it goes about three quarters of a mile to Hey-bridge, from whence a new cut continues the naviga-tion about one mile and a half into the Black-water, at Colliers-reach, below Maldon; there is a branch to Maldon, with a baſin.

The total length of this navigation is thirteen miles five furlongs, in which there is preſerved of the old channel near ten miles; the remainder is new cutting. The fall from Chelmsford is ſeventy-nine feet and a half.

The proprietors of this undertaking are incorporated under the title of "The Company of Proprietors of the *Chelmer and Blackwater Navigation*," and have the cuſtomary powers to

Chelmer and Blackwater Navigation.

to purchaſe, dig, enter, &c. and the neceſſary reſtrictions on, and accommodations to the mills: are not to deviate more than one hundred yards, from the line laid down in the book of reference. The ground allowed for the cuts, towing-path, ditches, &c. is forty yards; and for towing-paths only eight yards. Proprietors may raiſe 40,000l. for the purpoſes of this Act, to be divided into ſhares of 100l. each, and if neceſſary a further ſum of 20,000l. to indemnify which, they may demand the following

Rates of tonnage, viz.

For all coals, *two-pence* per chaldron per mile.

For all ſtone, *one-penny* per ton per mile.

For all lime, chalk, dung, and other manure, to be uſed only for the improvement of land, *one-penny* per ton per mile.

For all wheat, barley, rye, peaſe, beans, and tares, *one half-penny* per quarter per mile.

For all oats, malt, and all other ſorts of grain and ſeeds, not before mentioned, *one farthing* per quarter per mile.

For every ſack of meal, or flour, containing five buſhels, *one farthing* per ſack per mile.

For all other goods, wares, &c. *two-pence halfpenny* per ton per mile.

Exemption from Rates. Stone, gravel, and ſand, to be employed only in making and repairing public or private roads, not being turn-pike, in any townſhip, village, or hamlet, through which the ſaid navigation ſhall be made, and which ſhall not be carried more than five miles upon the ſame. But not to paſs any lock, unleſs the water ſhall flow over the waſte wire, &c.

No

No *wharfage* to be demanded at any of the company's wharfs, for goods, &c. provided the ſame do not lay more than twenty-four hours. And for chalk, lime, and other manure, not more than *three-pence* per ton; and for other goods, merchandiſe, &c. *one ſhilling* per ton, for any time not longer than ſix days; and if the ſame remain for any longer time than ſix days, *ſix-pence* per week per ton, ſhall be paid for the wharfage, coals always excepted. Chelmer and Blackwater Navigation.

Tolls may be varied.

Veſſels under twenty tons, not to paſs locks without leave, or paying for that quantity.

By this navigation the inhabitants of Chelmsford, and the ſurrounding country, will be particularly accommodated, by a very cheap carriage for all their imports, particularly coal. And the farmers cannot fail to be very materially intereſted in it, for by it their corn will be ſhipped for the London market at a very trifling expence, and inſtead of ſending their teams ſeveral miles through bad roads, they may now be profitably employed at home, in leſs laborious work, and under the maſter's eye.

CRINAN CANAL.

Crinan Canal.

Deſcription of a Canal from Loch Gilp to Loch Crinan, in the county of Argyll, Scotland. 33 *Geo. III. Ch.* 104.

THIS canal being a ſhort cut of only ſeven or nine miles, is intended to accommodate the trade of the Weſtern Iſles, particularly

Crinan Canal.

particularly the fiſheries; by it they will avoid a circuitous, and at times a very hazardous voyage in a dangerous ſea, round the peninſula of Cantire; and may at all ſeaſons arrive in ſafety and with diſpatch, in the Forth of Clyde, and the neighbouring parts, where their markets chiefly are.

There are two routes propoſed for one half of this canal, and which will be prefered, is not yet determined; by the neareſt line, the diſtance is ſeven miles, with ſixty-one feet riſe, and ſixty-two feet fall; this is called the Dell paſſage. The other is called the Auchinſhellach paſſage, paſſing through the Moſs of Crinan, this route is nine miles and a half long, with fifty-eight feet riſe, and fifty-nine feet fall. It is propoſed to make this canal twelve or fifteen feet deep, ſo that veſſels of large burthen may paſs conveniently.

The proprietors are incorporated by the name of "The Company of Proprietors of the *Crinan Canal*." The breadth of ground allowed for the canal, is one hundred and ſixty yards. The company are authoriſed to raiſe the ſum of 120,000l. to be divided into ſhares of 50l. each, for which a ticket ſhall be given, on paying to the clerk two ſhillings and ſixpence for each; no perſon to have more than ten votes, a further ſum of 30,000l. may be raiſed if neceſſary.

The *tolls* allowed to be taken for tonnage and wharfage, are—

For all goods, wares, &c. *three-pence* ſterling per ton per mile, and ſo in proportion.

For all coals, ſalt outward bound, lime, lime-ſtone, ſhell-ſand, marle, and all manures for land, *two-pence* per ton per mile, and ſo in proportion.

All

Crinan Canal.

All open boats, not exceeding ſeven tons burthen, ſhall pay no more than *fourteen-pence* per mile.

Alſo for harbour dues, a duty of *one-penny* per ton for all goods landed, or loaded, in the harbours or baſins. And *two-pence* per ton on all veſſels entering the harbours, without unloading or paſſing on the canal.

And for all veſſels paſſing light, or in ballaſt on the canal, *one-penny* per ton per mile.

Fractions to be taken, as for a quarter of a mile, and for a quarter of a ton.

No boat loaded with dung, or other manure to paſs, being loaded higher than the ſides of the boat.

For *wharfage* of more than twenty-four hours, a reaſonable allowance ſhall be made.

To prevent accidents, no fire or candle is to be kept burning on board any ſhip or veſſel in the harbours or baſins, between ſeven in the evening and ſeven in the morning, from September 29, to March 25; nor between eight in the evening and five in the morning, from March 25, to September 29.

DERBY CANAL.

Derby Canal.

A Deſcription of a Canal from the River Trent, at Swarkſtone Bridge, to Derby, and from thence to Little Eaton, with a cut from Derby, to join the Erewaſh Canal, near Sandiacre: with Rail-ways to Smithey Houſes, and Smalley Mills. 33 *Geo. III. Ch.* 102.

THIS canal commences at the river Trent, and running through the village of Swarkſtone joins the Trent and Merſey, or Grand Trunk Canal, and at about one furlong to the

 eaſtward,

Derby Canal.

eaſtward, it commences its principal courſe through Sinfin Moor, between Boulton and Oſmaſton, to the eaſt ſide of Derby, where it croſſes the river Derwent; from Derby, the cut to join the Erewaſh canal takes an eaſt courſe, paſſes Chaddeſden, Spooden, Burrowaſh, Breaſton, and joins the Erewaſh canal between Long Eaton and Sandiacre; from Derby to the North, there is a cut to Little Eaton, with rail-ways to Smalley mills, and Smithey houſes.

The length of the canal from the Grand Trunk to Derby, is five miles and a quarter, with twelve feet riſe. From Derby to the Erewaſh canal is eight miles and a half, with twenty-nine feet fall. From Derby to Little Eaton is three miles and a quarter, with ſeventeen feet riſe. The length of the principal rail-way to Smithey houſes is four miles and a half, that to Smalley mills is one mile and three quarters. Total length of canal is ſeventeen miles, with fifty-eight feet lockage.

The proprietors of this undertaking are incorporated under the name of "*The Derby Canal Company*," with power to purchaſe lands, &c. for completing the ſaid canal, and the rail-ways before mentioned; alſo have power to make other rail-ways, at any future time: a rail way to be made to Horſley Colliery, if Lord Cheſterfield ſhall deſire; alſo rail ways and cuts may be made to join the canal, by owners of mines, ground, &c. Reſtrictions and regulations are fully enacted in the Act, reſpecting the paſſing of boats on the Grand Trunk canal, which lock into the river Trent, to the ſouth of the Grand Trunk, and the mode of adjuſting the water, ſo that the Grand Trunk canal ſhall not ſuffer therein; and further for

for the accommodation of the commerce on this extenſive line of canals, the locks are directed to be made ninety feet long, and fifteen feet wide. The water and mills on the Derwent are protected, and regulations for their ſecurity are made. Derby Canal.

The land allowed for the canal, towing-path, &c. is twenty-ſix yards in breadth; except for docks, baſins, deep cutting, or embanking; and not to deviate more than one hundred yards from the line laid down in the book of reference.

For the purpoſes of this Act, the company are empowered to raiſe 60,000l. to be divided into ſhares of 100l. each, and for each ſhare ſhall be given a ticket or inſtrument, having the common ſeal of the company, and for which ſhall be paid two ſhillings to the clerk; if the former ſum is inſufficient, the company may raiſe a farther ſum of 30,000l.

The *rates of tonnage* are not to exceed—

For every ton of lime, lime-ſtone, and other ſtone, coal, and coak, navigated on that part of the canal between the river Trent and the Grand Trunk canal, and not carried further upon this canal, *three-pence* per ton, and ſo in proportion for a leſs quantity.

For every ton of lime, lime-ſtone, and other ſtone, coal, coak, goods, wares, &c. navigated between the river Trent and the town of Derby (except ſuch lime, &c. ſhall be navigated only between the river Trent and the Grand Trunk canal) *nine-pence*, and ſo in proportion for a leſs quantity.

For every ton of lime, and lime-ſtone, carried between Derby and Little Eaton, and upon the rail ways, *four-pence*, and ſo in proportion.

Derby Canal.

For every ton of bricks, grit-ſtone, or free-ſtone for building, &c. carried between Derby and Little Eaton, and upon the rail ways, *three-pence*, and ſo in proportion.

For every ton of coal, coak, goods, &c. carried between Derby and Little Eaton, and upon the rail ways, *one ſhilling and five-pence*.

For every ton of coal, coak, lime, lime-ſtone, and other ſtone, goods, wares, &c. navigated between Derby and the Erewaſh canal, *ten-pence*, and ſo in proportion.

Provided always, that goods, &c. brought from the river Derwent, through the Feeder, near St. Michael's Weir, and afterwards carried on this canal, &c. ſhall not be liable to pay any further or greater ſum of money, than ſuch goods, &c. would have been liable to, if navigated only upon this canal, &c.

Provided always, no boat, &c. laden with hay, ſtraw, corn in the ſtraw, or any kind of manure, ſhall paſs any lock without conſent, unleſs the water ſhall flow over the waſte weir.

Alſo for every horſe, mare, gelding, mule, or aſs (not carrying, or drawing, &c.) which ſhall go, or travel on the rail ways, *one-penny*.

For all cows, and horned, or neat cattle, &c. *one halfpenny*.

And in conſideration of the increaſed trade on the Erewaſh canal, occaſioned by this canal, the Erewaſh company have agreed, and it is enacted, that ſo ſoon as a junction is completed, the Erewaſh canal company ſhall receive no more than

For every ton of coals, or coak, navigated on the Erewaſh, and paſſing into the Derby canal, *five-pence*.

For

For every ton of mercantile goods, paſſing on the Erewaſh between the Derby canal and the river Trent, *three-pence*, and

Derby Canal.

For lime, and all other articles navigated on the Erewaſh, and afterwards brought on the Derby canal, only half of the general rates ſhall be paid, allowed by the 17th Geo. III.

Theſe exemptions to ceaſe, if the Derby company permit any other canal, rail way, &c. to be made between the Erewaſh canal and the town of Derby.

The tonnage alſo on the river Trent navigation, is reduced to half the allowed rates on goods, &c. which ſhall not have been carried on the Trent navigation for a greater diſtance than three miles, and which ſhall be carried upon the Derby canal, or the north ſide of the Grand Trunk canal.

The Derby canal company are to permit five thouſand tons of coals, annualy to paſs free of all rates, &c. for the uſe of the poor of the town of Derby; the diſtribution of which, is under a committee of three members of the corporation of Derby, and three proprietors of the navigation to be choſen annualy.

Exemption, all gravel and ſand, for making and repairing public roads (turnpike roads only excepted) in any townſhip, &c. through which the ſaid canal, &c. ſhall be made; alſo dung, ſoil, marl, aſhes of coal or turf, and all other manure (except lime) to be uſed only on the lands in any pariſh, townſhip, &c. through which the canal, &c. ſhall paſs; and all puncheons, clogs, or other wood, to be uſed under ground, in any of the collieries in or near the line of the canal, &c.

ſhall

Derby Canal.

ſhall not be liable to payment of any rates, &c. ſo that the ſame do not paſs any lock, unleſs the water ſhall flow over the waſte weir, and on giving three hours notice.

For *wharfage*, whatever ſhall remain more than one month on wharf, &c. a reaſonable ſatisfaction ſhall be made; in caſe of diſpute to be adjuſted by the commiſſioners.

The dividends on this concern are not to exceed eight per cent. the ſurplus if any, ſhall be applyed to form a bank of 4000l. to anſwer emergencies; after which the rates are to be lowered, ſo as to bring the profits as near to eight per cent. as may be.

The following rates are allowed to be taken by the Trent and Merſey, that is the Grand Trunk canal. The ſum of *one ſhilling*, for every ton of goods, wares, &c. which ſhall turn, paſs, or be carried into, or out of, the ſaid Trent and Merſey canal, along the canal which joins the river Trent, to the ſaid canal at Swarkſtone, or any part thereof, (except coal, coak, lime, lime-ſtone, and unwrought ſtone, brought along the Derby canal from Little Eaton, or any of the villages on the line; or gotten in any of the pariſhes of Melborne, Stanton by Bridge, and Caſtle Donnington, in the counties of Derby and Leiceſter; and except ſuch goods and merchandiſe as ſhall be carried for the uſe, and to be really uſed by perſons reſiding between the Trent and Merſey canal, and the river Trent within the pariſh of Swarkſtone). The Trent and Merſey canal company, are alſo authoriſed to demand for all goods, &c. which ſhall be carried or conveyed acroſs their canal, the ſame rates as they are authoriſed to demand for ſimilar goods, &c.

&c. which are navigated one mile on their ſaid canal. They are alſo authoriſed to take ſuch rates for goods, &c. except bricks, manufactured in the pariſhes of Barrow, Twyford, Stenſon, Findern, and Willington in the county of Derby, and not paſſing any lock on the ſaid Trent and Merſey canal, which ſhall be carried from the weſtward of Swarkſtone, and along the Derby canal; and down the Derby canal to Swarkſtone, and from thence weſtward on the Trent and Merſey canal, ſuch ſums of money as the ſaid Trent and Merſey canal would have been entitled to, if ſuch goods, &c. had been navigated on their canal from Shardlow to Swarkſtone, or from Swarkſtone to Shardlow. Derby Canal.

A cut is to be made by the Derby Canal company at Weſton Cliff, to join the river Trent with the Grand Trunk canal, if deſired by the proprietors of the lime works at Brudon, in Leiceſterſhire; provided a canal or rail way ſhall at any future time be made from the ſaid lime works, to the river Trent.

If the Derby canal ſhall cauſe a reduction of the tolls on the Mansfield Road, below four per cent. then the company are to make the ſame good to ſaid truſt.

And as this canal will materially hurt the profits of the river Derwent navigation, the company are empowered to buy the ſame, for the ſum of 3996l. and having bought, to exerciſe ſimilar rights, &c. to the former owners.

The advantages of this canal will be particularly beneficial to the populous town of Derby, where of conſequence fuel is

in

Derby Canal.

in great requeſt; this will be abundantly ſupplyed by the Cromford and Erewaſh canals, and thoſe pits which lay to the north of Derby; where alſo is abundance of iron-ſtone, which muſt ever remain unprofitable to the owner, where a cheap and certain carriage to the various markets cannot be had; with this ſcheme is incorporated one of charity, five thouſand tons of coal, are annualy to be navigated free of all tolls, for the accommodation of the poor inhabitants of the town of Derby.

Dearne and Dove Canal.

DEARNE AND DOVE CANAL.

A Deſcription of the Courſe of a Canal from the River Dun Navigation, near Swinton, to Barnſley, in the Weſt Riding of the County of York. 33 *Geo. III. Ch.* 115.

THIS canal commences from the cut which has been made for the accommodation of the river Dun navigation, between Swinton and Mexbrough, and proceeds by Wath, Wombwell, and Ardſley, to near Barnſley; there to form a junction with the Barnſley canal, which joins the river Calder. There are two ſmall branches, one parallel with Knolbeck Brook, to the iron works at Cobcar Ing, the other along the head ſtream of the river Dove, to Worſbrough Bridge; with a propoſed extenſion of this branch near one mile and a half farther, to Rockcliff Bridge, adjoining the grounds of Earl Strafford, at Wentworth Caſtle.

The whole length of this canal from the junction with the river Dun, to Barnſley, is nine miles and a quarter, with one hundred

hundred and twenty-five feet riſe, from the river Dun to Barnſley; viz. in the firſt four miles, forty-one feet; in the next two miles, twenty-four feet; and in the remaining three miles, ſixty feet; principally between the ſixth and ſeventh miles. The branch to Cobcar Ing, is one mile and three quarters, and is level, by means of ſome deep cutting at the extremity. The branch to Worſbrough Bridge is one mile five furlongs in length. Dearne and Dove Canal.

The proprietors of this undertaking are incorporated under the name of "The *Dearne and Dove Canal* Company," and have the uſual powers for the purpoſe of making the canal: and are not to deviate more than one hundred yards from the line laid down in the book of reference: there are alſo reſtrictions for preſerving the water of ſundry rivers and brooks, by gauge weirs, tumbling bays, &c. and for the ſecurity of mills, &c. The two wells in the town of Barnſley are not to be prejudiced or affected. No water to be taken from the branch to Cobcar Ing, to the prejudice of Earl Fitzwilliam's eſtate, grounds, &c. which lay to the ſouth. Nor any water to be taken, to the prejudice of Earl Strafford.

The general breadth of ground allowed for the canal, towing-path, &c. is twenty-ſeven yards. Proprietors of mines, &c. may make rail ways to join the canal, not exceeding one thouſand yards diſtance from the canal, except in the pariſh of Wath, where two thouſand yards are allowed. And other collateral branches may be made to mines, either by the company or land owners.

The company are authoriſed to raiſe the ſum of 60,000l. to be divided into ſhares of 100l. each; and may raiſe an

Dearne and Dove Canal.

additional ſum of 30,000l. if the firſt ſum is inſufficient. A deed or certificate for each ſhare is to be given, under the common ſeal of the company, which ſhall entitle, &c. the poſſeſſor.

The *allowed rates* are not to exceed—

For every quarter (containing eight Wincheſter buſhels) of wheat, ſhelling beans, peaſe, vetches, and lintels; for rape, line, cole, and muſtard ſeed; for apples, pears, onions, and potatoes, carried the whole length of the canal, that is from Swinton to Barnſley, and in the ſame proportion for any leſs diſtance, *four-pence*.

For every quarter of barley, carried the whole length of the canal, and in proportion for a leſs diſtance, *three-pence*.

For every quarter of oats, or malt, carried the whole length of the canal, and in proportion for a leſs diſtance, *two-pence halfpenny*.

For every pack or ſheet of wool, dried pelts, or ſpetches, weighing three hundred and twelve pounds, the ſheet included, carried the whole length of the canal, and in proportion for a leſs weight or diſtance, *four-pence*.

For every ton of coal, ſleck, cinders, culm, and charcoal, per mile, *one-penny*.

For every ton of lime, per mile, *one-penny*.

For every ton of lime-ſtone, per mile, *three farthings*.

Except, if any boats, &c. which carry up either lime or lime-ſtone, return loaded with coal, or other articles, amounting to thirty tons or more in each boat, then ſuch boat to be rated and charged; for lime, per ton per mile, *three farthings*; for lime-ſtone, per ton per mile, *one halfpenny*.

For every ton of ſtone, iron-ſtone, flag paving-ſtone, and ſlate, per mile, *one penny*.

Dearne and Dove Canal.

But if the boats, &c. which carry up the laſt mentioned article, come down loaded as before mentioned, then to be charged, per ton per mile, *three farthings*.

For every ton of old or pig iron, per mile, *one-penny*.

For every ton of caſt metal goods, ready for the purpoſe for which they are intended, except dreſſing, cleaning and putting together; and for every ton of bar-iron, per mile, *two-pence*.

For every ton of Engliſh oak timber and plank, elm, aſh, and other Engliſh timber, containing forty cubical feet, according to the cuſtomary way of meaſuring, per mile, *three halfpence*.

For every ton of fir, and all other kinds of foreign timber, containing fifty cubical feet, according to the cuſtomary way of meaſuring, per mile, *three-halfpence*.

For every ton of deals and battens, equal to thirty deals of twelve feet long, three inches thick, and from nine to twelve inches broad, per mile, *three-halfpence*.

And for every ton of groceries of all kinds, linen and woolen yarn, cotton, flax, hemp, manufactured goods of all ſorts, and all other kinds of goods, wares, &c. per mile, *two-pence*.

Provided always, that if any boat or other veſſel going up or down the ſaid canal, or either of the collateral cuts, ſhall paſs or go through any one or more of the locks on ſaid canal or cuts, and ſhall not have paſſed loaded, more than ſix miles upon the canal, &c. ſhall nevertheleſs have the loading rated and charged the ſame, as if it had been actually navigated the full length of ſix miles; and if the loading ſhall not amount to thirty tons, yet it ſhall be rated and charged tonnage for thirty tons: and in caſe the loading ſhall be compoſed of vari-

Dearne and Dove Canal.

ous kinds of articles, chargable at different rates or tonnage, then the weight ſhort of thirty tons, ſhall be charged in the ſame manner as that part of the loading which ſhall be ſubject to the higheſt rate of tonnage; but if ſuch boat be going up, and return with a loading of coal, or other matters, and ſhall pay the rates for thirty tons or more, for the length of ſix miles and upwards in coming down, then the loading in ſuch boat ſhall be charged rates in going up, according to the quantum thereof, and the diſtance carried.

All boats which ſhall paſs light or not laden, either up or down this canal, ſhall pay *three halfpence*, per ton per mile for thirty tons, for the whole length of the canal, unleſs the ſame be going for a load, or returning from taking one, in which caſe, it ſhall be exempt from the payment of any rates, for ſuch paſſing light or unloaded.

For *craneage and porterage* per ton not to exceed *ſix-pence*.

For *wharfage*, any ſum not exceeding the following table.

RATES OF WHARFAGE.	More than 24 Hours, and not more than Six Days.	Six Days, but leſs than One Month.	One Month, but leſs than Six Weeks.	Six Weeks, but leſs than Two Months.	Two Months, but leſs than Ten Weeks.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
For every Ton of Goods, Wares, Merchandize, &c.	0 0 6	0 0 9	0 1 0	0 1 3	0 1 6
For every Ton of *Engliſh* Timber, and Pig and Bar Iron - - - -	0 0 3	0 0 6	0 0 9	0 1 0	0 1 3
For every Ton of Coals, Stone, Iron Stone, Lime Stone, Flint, Clay, and Sand - - -	0 0 0½	0 0 1	0 0 1½	0 0 2	0 0 2½
For every Ton of Lime, Bricks, Tiles, Plaiſter, and Soaper's Aſhes - - - -	0 0 1	0 0 2	0 0 3	0 0 4	0 0 5
For every Quarter of Corn of all Kinds, Cole, Rape, Line and Muſtard Seed, Apples, Pears, Onions, and Potatoes - - - -	0 0 0½	0 0 1	0 0 1½	0 0 2	0 0 2½

And ſo in Proportion for any longer Space of Time the ſeveral Articles ſhall lay upon, or within ſuch Wharfs, Staiths, Warehouſes, or Granaries.

Goods which do not lie twenty-four hours, are not to be charged.

The

Dearne and Dove Canal.

The rates may be lowered.

Exemption, all dung, ſoil, marl, aſhes of coal and turf, and all other manure (except lime) for the improvement only of the lands or grounds belonging to any perſon whoſe lands the ſaid canal, or its works ſhall paſs through, and all materials for making, repairing, or paving any public or private roads (except flag-ſtones, curb-ſtones, and paving-ſtones) ſhall not be liable to pay any rates, duties, &c. but not to paſs any lock unleſs the water flows over the waſte wire or gauge paddle.

The junction of this, with the Barnſley canal, at or near Barnſley, is to be made on the principle of a level canal. At the junction or within one hundred and fifty yards thereof, ſhall be erected at the joint expence of the two companies, a ſtop lock, with gates, &c. ſufficient to prevent either canal from ſuffering by want of water in the other canal; and if the water at any time ſhall be lower than four feet ſix inches, on either of the ſills of the ſaid lock, the keeper of the other canal may ſtop the paſſage, till the water ſhall be of the given height. And in order to preſerve the navigation at all times, between Barnby Bridge and the Dearne and Dove canal, a ſtop gate ſhall be erected, and kept in conſtant repair at mutual expence, ſo as completely to prevent the loſs of water from the head level, beyond the collateral cut to Barnby Bridge. All the locks on this canal are to be of ſuch dimenſions as to admit boats, &c. of the conſtruction commonly uſed on the river Dun. The company are alſo enjoined to keep and maintain on the whole line of the canal, and upon the ſills of the locks, four feet ſix inches of water conſtantly; and no boat of leſs burthen than thirty tons ſhall paſs locks, without leave; unleſs that tonnage ſhall be paid for.

This

Dearne and Dove Canal.

This canal in conjunction with the Barnſley canal cannot fail being of immence importance to the trade and induſtry, of the Weſt Riding of the county of York, for by a ſhort trip of twenty miles, the Calder and Dun navigations are effectually joined, and numberleſs mines of coal, iron, &c. on the line will be accommodated, with a cheap and certain carriage for their ponderous produce; cheap carriage enables to ſell at a low price, which encourages as well domeſtic as foreign conſumption. And the variety of articles expected to be carried on this canal, may be ſurmiſed from the various articles enumerated, in the table of rates.

DUDLEY EXTENTION CANAL.

Dudley Extention Canal.

Deſcription of a Canal from the Dudley Canal, at Netherton, to the Worceſter and Birmingham Canal, at Selly Oak, in the County of Worceſter. 33 *Geo. III. Ch.* 121.

THIS canal joins the Dudley canal near Netherton, and making a bend to the ſouth weſt, round the high ground, comes to Windmill-end, and taking a courſe ſouth-eaſt paſſes through Combes Wood, by Hales Owen, and at the foot of that enchanting ſpot the Leaſowes, ſoon after which it enters a very long tunnel, and proceeds by Weoley Caſtle to Selly Oak, where it joins the canal now executing from Birmingham to Worceſter, making a courſe of ten miles and five furlongs; and all level. There is a ſhort tunnel near Combes Wood of ſeventeen chains, but the tunnel beyond Hales Owen, is nearly two miles long. There are two collateral cuts from the canal at Windmill-end, towards the town of Dudley, with a fall of ſixty-four feet.

The

Dudley Extention Canal.

The Act of Parliament authoriſing this canal, commences by reciting certain clauſes of the Dudley canal Acts. 16, 25, and 30 Geo. III. names the new ſubſcribers, and incorporates them with the Dudley company, giving them ſimilar powers, and making them liable to the ſame regulations, &c. This canal muſt be conſidered therefore, only as an extention of the Dudley canal; and this company may be compelled to purchaſe ſhares of former proprietors, who may be unwilling to become proprietors in this new ſcheme. The canal is not to deviate more than one hundred yards, from the line laid down in the book of reference. No water to be taken from the rivers Rea, and Stowr, and certain rivulets, &c. and flood weirs to be erected for the benefit of thoſe rivers, &c. no water for this canal, to be taken from any of the ſupplies of the Birmingham and Fazeley canal. Owners of fire engines may take water from the canal, for the uſe of ſaid engines.

For the purpoſes of this Act, the company are authoriſed to raiſe the ſum of 90,000l to be divided into ſhares of 100l. each; and a further ſum of 40,000l. may be raiſed if neceſſary.

The *rates of tonnage* are not to exceed—

For all coal and coak which ſhall paſs into or through the tunnel to be made in the pariſhes of Hales Owen and Northfield, towards the Worceſter and Birmingham canal, and which ſhall not paſs along the ſaid Worceſter and Birmingham canal, to or towards the town of Birmingham, nor have paid any of the rates or dues payable to the ſaid company of proprietors, under the Act of the twenty-fifth of his preſent Majeſty, *two ſhillings* a ton, and ſo in proportion for any greater or leſs quantity than a ton.

For

Dudley Extention Canal.

For all coal and coak which ſhall paſs into or through ſuch tunnel, to or towards the ſaid Worceſter and Birmingham canal, and which ſhall not paſs along the ſaid laſt-mentioned canal, to or towards the town of Birmingham, and which ſhall have paid any of the rates or dues under the ſaid Act of the twenty-fifth of his ſaid Majeſty, *one ſhilling and nine-pence* a ton, and ſo in proportion.

For all coal and coak carried into or through ſuch tunnel to be made as aforeſaid, and along the ſaid Worceſter and Birmingham canal, to or towards the town of Birmingham, and which ſhall not paſs along any other part of the ſaid Worceſter and Birmingham canal, nor have paid any of the rates or dues to the ſaid company of proprietors, under the ſaid Act of the twenty-fifth of his ſaid Majeſty, *two ſhillings* a ton, and ſo in proportion.

For all coal or coak carried into or through ſuch tunnel to be made as aforeſaid, and along the ſaid Worceſter and Birmingham canal, to or towards the town of Birmingham, and not paſs along any other part of the ſaid laſt-mentioned canal, and which ſhall have paid any of the rates or dues under the ſaid Act of the twenty-fifth of his ſaid Majeſty, *one ſhilling and nine-pence* a ton, and ſo in proportion.

For all coal, coak, and iron-ſtone, carried between the preſent Dudley canal and the aforeſaid tunnel, and which ſhall not paſs into or through ſuch tunnel or into the preſent Dudley canal, *two-pence* per ton per mile, and ſo in proportion for any quantity greater or leſs than a ton, and for any diſtance greater or leſs than a mile.

For all coal, coak, and iron-ſtone, carried between the ſaid tunnel, and which ſhall paſs out of this canal into the preſent

Dudley Extention Canal.

Dudley canal, without having paſſed into or out of ſuch tunnel, *ſix-pence* a ton, and ſo in proportion.

For all goods, wares, and merchandize (except coal, coak, lime, and lime-ſtone,) which ſhall paſs into or through the ſaid tunnel, and which ſhall not have paid, or be liable to pay, any of the rates or dues payable to the ſaid company of proprietors under the ſaid Act of the twenty-fifth year of his preſent Majeſty, *two ſhillings* a ton, and ſo in proportion.

For all goods, wares, and merchandizes (except coal, coak, lime, and lime-ſtone) which ſhall paſs into or through ſuch tunnel, and which ſhall have paid, or be liable to pay, any of the rates or dues under the ſaid Act of the twenty-fifth of his ſaid Majeſty, *one ſhilling and ſix-pence* a ton, and ſo in proportion.

For all goods, wares, merchandize, and commodities whatſoever (except coal, coak, iron-ſtone, lime, and lime-ſtone) carried between the preſent Dudley canal and the aforeſaid tunnel, without paſſing into or through ſuch tunnel, *two-pence* a ton per mile, and ſo in proportion.

For all goods, wares, merchandize, lime, lime-ſtone, and commodities whatſoever, carried between the Worceſter and Birmingham canal, and the eaſt end of the ſaid intended tunnel, and which ſhall not paſs into or out of ſuch tunnel, *three-pence* a ton, and ſo in proportion.

For all lime and lime-ſtone which ſhall have paid the tonnage impoſed under the ſaid Act of the twenty-fifth of his preſent Majeſty, upon lime and lime-ſtone, paſſing out of the ſouth end of the tunnel of the preſent Dudley canal, and which ſhall not paſs through a tunnel to be made on this canal, at or near Gorſty Hill, in the pariſhes of Rowley Regis and Hales Owen, *one-penny* a ton per mile, and ſo in proportion.

For

Dudley Extention Canal.

For all lime and lime-ſtone which ſhall have paid the tonnage impoſed under the ſaid Act of the twenty-fifth of his preſent Majeſty, upon lime and lime-ſtone paſſing out of the ſouth-end of the tunnel of the preſent Dudley canal, and which ſhall paſs through ſuch tunnel, at or near Gorſty Hill, *four-pence halfpenny* a ton, and ſo in proportion.

For all lime and lime-ſtone which ſhall not have paid to the ſaid company of proprietors any of the rates or dues impoſed by the ſaid Act of the twenty-fifth of his preſent Majeſty, upon lime and lime-ſtone paſſing out of the ſouth-end of the tunnel of the preſent Dudley canal, and for which no other rate or due is impoſed by this preſent Act, *nine-pence* a ton, and ſo in proportion.

For all goods, wares, merchandize, and commodities, navigated upon that part of the Dudley canal which was made under the powers of the Act, of the ſixteenth year of his preſent Majeſty, and which ſhall not have paid or be liable to pay any of the other rates or dues granted to the ſaid company of proprietors by the ſaid Acts of the ſixteenth and twenty-fifth years of his ſaid Majeſty, or this preſent Act, the ſum of *two-pence* a ton per mile, and ſo in proportion.

The powers granted by this Act, do not extend to enable this company to reduce the rates of tonnage upon coal, goods, &c. paſſing out of the Stourbridge navigation upon this canal, without conſent of the Worceſter and Birmingham canal company, firſt obtained at a general aſſembly.

The Worceſter and Birmingham canal company have agreed, that when any reduction of the cuſtomary rates for navigating the Worceſter and Birmingham canal ſhall take

Dudley Extention Canal.

place, a ſimilar reduction ſhall be made and continued on goods, &c. paſſing from this canal, except ſuch as are navigated towards Birmingham; and further, they have agreed, not to take more than the following *rates*, viz.

For all coals, goods, merchandize, and other things, which ſhall paſs from this canal into or upon the Worceſter and Birmingham canal, and from thence into or upon the canal intended to be made from the ſaid Worceſter and Birmingham canal towards the town of Stratford upon Avon, the ſame ſum in groſs for every ton of ſuch coals, goods, merchandize, and things, as would for the time being have been payable to the company of proprietors of the Worceſter and Birmingham canal for the like articles, if the ſame had been brought from the town of Birmingham, and had paſſed along the ſaid Worceſter and Birmingham canal, and from thence into the Stratford Canal; and ſo in proportion for any leſs quantity than a ton, but without any regard to the diſtance the ſame ſhall paſs upon the ſaid Worceſter and Birmingham canal.

For all coal and coak which ſhall paſs from this canal, into the ſaid Worceſter and Birmingham canal, and along the ſame towards the city of Worceſter, and ſhall not paſs into the Stratford canal, the ſame tonnage for every ton of ſuch coals and coak as would for the time being have been payable to the company of proprietors of the ſaid Worceſter and Birmingham canal for ſuch coals and coak, if the ſame had been brought from the town of Birmingham, and ſo in proportion for any leſs quantity than a ton, but without any regard to the diſtance the ſame ſhall paſs upon the ſaid Worceſter and Birmingham canal.

For

Dudley Extention Canal.

For all goods, merchandize, and other things (except coals and coak) which ſhall paſs from this canal into the ſaid Worceſter and Birmingham canal, and along the ſame towards the city of Worceſter, and ſhall not paſs into the Stratford canal, the ſame rate of tonnage per mile for every ton of ſuch goods, merchandize, and other things, according to the diſtance the ſame ſhall paſs upon the ſaid Worceſter and Birmingham canal, as ſhall for the time being be payable to the ſaid company of proprietors of the Worceſter and Birmingham canal for ſuch like goods, merchandize, and other things, brought from the town of Birmingham, and paſſing upon the ſame part only of the ſaid Worceſter and Birmingham canal.

For all coals, goods, merchandize, and other things, which ſhall paſs from this canal, into the Worceſter and Birmingham canal, and along the ſame to or towards the town of Birmingham, *two-pence* per ton, and ſo in proportion for any leſs quantity than a ton, and without any regard to the diſtance the ſame ſhall paſs upon the ſaid Worceſter and Birmingham canal: and,

For all goods, merchandize, and other things, which ſhall paſs upon any part of the ſaid Worceſter and Birmingham canal, and into this canal, the ſame rates of tonnage as the ſaid company of proprietors of the Worceſter and Birmingham canal are entitled to under or by virtue of the Act of the thirty-firſt of his preſent Majeſty, for making and maintaining the ſaid Worceſter and Birmingham canal, in reſpect of the like kind of goods, merchandize, and things, paſſing upon the ſame part of the Worceſter and Birmingham canal.

A ſtop lock is to be erected within five hundred yards of the Worceſter and Birmingham canal to prevent loſs of water,

Dudley Extention Canal.

and if the water is not kept on the ſame level in both canals, the paſſage may be ſtopped.

If by reaſon of making this canal, the profits of the Stourbridge canal ſhall be reduced below 12l. on each ſhare, the proprietors of this canal are to make up the deficiencies, ſo as the ſame does not exceed 3l. per ſhares, and they ſhall in the ſame year, have received by their rates 5l. on their ſhares. The Worceſter and Birmingham canal company, are alſo exonerated from that clauſe, which makes them liable o make up deficiencies to Dudley canal company.

This extenſion of the Dudley canal may be conſidered as a rival ſcheme to the Old Birmingham canal, which has long enjoyed a very beneficial monopoly; it is to be hoped the public will be ſome way benefitted; but this much is certain, the Old Birmingham ſhares have been greatly affected in price, in conſequence of the preſent ſcheme.

Elleſmere Canal.

ELLESMERE CANAL.

Deſcription of a Canal from Shrewſbury, in Shropſhire, to the River Merſey, near Netherpool, in the County of Cheſter. 34 *Geo. III. Ch.* 91.

THIS canal joins the river Severn on the north-ſide of Shrewſbury, at Bagley-bridge, and taking a northerly courſe, paſſes Newton, Walford, Baſchurch, Weſton, Lullingfield, and Hordley; here a cut branches to the weſt, called the Llanymynech

mynech branch, and goes to the town and lime works of that name, being a diſtance of twelve miles; the canal then paſſes Francton Common, whence a branch goes to the eaſt, called the Whitchurch branch, and paſſes Elleſmere, Welchampton, Whitchurch, and finiſhes at Prees Heath; this cut is fourteen miles long; the canal is then continued and paſſes the Ridges, Old Martin, croſſes the river Morlas, and ſoon after the river Ceriog, it then paſſes within a ſhort diſtance Chirk Caſtle, and croſſes the river Dee at Pontoyſyllte, by means of an aqueduct; it then proceeds by Rhuabon, Newhall, Berſham, Wrexham, where a branch goes to the weſt called the Brombo' branch, which is three miles and a half long; it then paſſes Gresford, whence a branch of four miles goes to Holt; from thence in nearly a direct line it paſſes Pulford, Leach Hall, and croſſing the river Dee, paſſes on the weſt ſide of Cheſter, and then by Backford, Chorlton Croughton, Stoke, Stanney, Whetby, and there joins the river Merſey, being a diſtance of fifty-ſeven miles, with five hundred and thirty-ſeven feet of lockage; which more particularly is as follows; from the junction with the Severn at Bagley Bridge to Newton, is one mile and a quarter, with one hundred and ten feet riſe; from thence to Francton Common, is fifteen miles and a half, and is level; from thence to Newmartin Common, is three miles and three quarters, with forty-two feet riſe; from thence to the Dee, is eight miles, and level; from thence, immediately is ſeventy-five feet riſe, in half a mile; from thence to the Brombo' branch, is eight miles and a half and level, (this is the head level) from thence to Cheſter is eleven miles and a half, with three hundred and eighty feet fall; from Cheſter to the Merſey is eight miles.

Elleſmere Canal.

The

Elleſmere Canal.

The Llanymynech branch is twelve miles, with twenty-one feet fall.

The Whitchurch branch is fourteen miles, with

The Brombo' branch is three miles and a half, and level.

The Holt branch is four miles and level.

The Dee will be croſſed by an immenſe aqueduct of ſeven arches, of the height of one hundred and thirty feet, and length three hundred and fifty feet; excluſive of conſiderable embanking; the aſcent on the Welch ſide is by three locks, and the deſcent on the Cheſter ſide by four locks.

In the courſe of the canal there will be two tunnels, one at Weſton Lulling-field, two furlongs and forty-ſeven yards; the other near Chirk, of three furlongs and one hundred and fifteen yards.

The proprietors of this canal are incorporated by the name of "The Proprietors of *The Elleſmere Canal*," with the cuſtomary powers for making the canal and branches, not to deviate more than one hundred yards from the line laid down in the book of reference. No water to be taken from the rivers Perry and Belan, nor from the river Dee for the uſe of that part of the canal which is between Cheſter and the Merſey. The breadth of ground allowed for the canal, towing path, &c. is. twenty-four yards. May take all ſprings, brooks, &c. within two miles, for the uſes of the canal, except as above.

The proprietors are authoriſed to raiſe the ſum of 400,000l. to be divided into ſhares of 100l. each, for which a ticket ſhall be

be given on paying to the clerk two ſhillings for each; no perſon to have more than ten votes, a further ſum of 50,000l. may be raiſed if neceſſary. Elleſmere Canal.

The *rates of tonnage* are not to exceed—

For all coal, coak, culm, lime, lime-ſtone, and rock ſalt, *three halfpence* per ton per mile.

For all free-ſtone, timber, ſlate, iron-ſtone, lead-ore, iron and lead, *two-pence* per ton per mile.

For all other goods, wares, merchandize, &c. *three-pence* per ton per mile.

Fractions to be taken, as for a mile, and as for a quarter of a ton.

Exemption from Rates. Coal, coak, culm, lime, or lime-ſtone only, carried along any part of the canal between Pont Cyſyltee and the upper end of the Cegedog Valley, near Brombro, provided ſuch coal, &c. ſhall have paſſed ten miles on the canal, and have paid tonnage for the ſame. *Alſo*, all dung, ſoil, marle, aſhes, or other manure (except lime) and all gravel, ſand, or other materials for making or repairing any public roads, in any pariſh through which the canal or branches ſhall go, provided the ſame do not paſs any lock, unleſs the water ſhall flow over the waſte weir at the time.

The navigation to be open between the hours of ſeven and five, in the months of November, December, January, and February; and between the hours of five and ſeven in the months of March, April, September, and October; and between the hours of four and nine, in the months of May,

Elleſmere Canal.

June, July, and Auguſt. No boat to paſs any lock without leave, of leſs dimenſion than ſixty feet long, and twelve feet wide; or of leſs burthen than thirty tons; unleſs the water ſhall then flow over the waſte weir; or two boats ſixty feet by ſeven feet, and of thirty tons together, ſhall paſs at the ſame time. Except in ſuch parts of the canal, as may be conſtructed for boats of ſeven feet beam only, and then of not leſs than eighteen tons burthen.

Paſſage boats are not to be navigated, but upon terms mutually ſettled between the proprietors.

For ſecurity of the river Dee navigation, that part of the canal, &c. which runs through the grounds belonging to the river Dee company is to be made and continued by the Dee company, and for which they are to be reimburſed, by this canal company. The tolls of the river Dee are not to be affected or lowered by this Act; but if by reaſon of this canal, the rates of the river Dee ſhall not amount to the annual ſum of 210l. the ſame ſhall be made good by this company. No water to be taken from Finchetts Gutter, except flood water. The Cheſter water works are indemnified from injury by this canal.

The tolls of the Corporation of Liverpool are not to be affected by this Act, but to remain as heretofore.

The company are empowered to extend the Whitchurch branch, ſo as to form a junction with the Cheſter canal, at a place called the Crows Neſt, in Tattenhall; if the conſent of the land owners can be obtained; this branch will go by

Malpas

Malpas and Harthill: when this junction is formed, the waſte water of the Cheſter canal may be taken for the uſes of this canal. Elleſmere Canal.

The Llanymynech branch may be extended to Morda Bridge, near Oſweſtry, with conſent of land owners: the making of this branch, *i. e.* the Llanymynech branch, is altogether ſuſpended for two years, until the report of Meſſrs Jeſſop and Dadford, Engineers, &c. be obtained.

The courſe of this canal is through a county abounding with ſlate, lime, coal, and other minerals, which for want of water carriage have hitherto laid in a manner unattended to, theſe muſt now riſe to notice and profit, and will afford a conſiderable employ for the labourer; by this canal an inland navigation will be completed between the Briſtol channel and the Iriſh Sea, uniting thoſe great trading cities Briſtol and Liverpool, with all the intermediate ones; ſo that whether viewed for its local benefits, or its commercial advantages, it appears of the higheſt importance.

Of the local benefits it may be obſerved, the county from Shrewſbury to Oſweſtry, has hitherto been ſupplyed with coal and lime by land carriage, from a great diſtance, and at a great expence; the Llanymynech branch embraces all the advantages of the main line, in the articles of coal, lime, and ſlate, and is of infinite importance to the counties of Montgomery, Cheſhire, and Shropſhire, for a ſupply of fuel. The Brombro branch reaches the iron works of Mr. Wilkinſon, which for extent and importance are beneficial not only to this nation, but to all Europe. The ſmelting works at Berſham will be

Elleſmere Canal.

materially accommodated, and their ſavings muſt benefit the conſumers; the corn trade through the whole line, is great and extenſive.

The Worral part from Cheſter to the Merſey, has long been a favourite ſcheme, and now promiſes all the advantages expected; a paſſage boat is intended to be eſtabliſhed between Cheſter and Liverpool daily, which cannot fail of being highly beneficial to both towns, and to the intermediate county. This part of the canal is conſtructed for veſſels of fourteen feet beam. The other parts for only ſeven feet beams.

Such activity has been uſed in this concern, that this part of the canal, and the Llanymynech branch, it is expected will be navigable in the enſuing Spring.

River Foſs Navigation.

RIVER FOSS NAVIGATION.

Particulars of an Act for making a Navigable Communication from the River Ouſe, at York, to Stillington Mill, in the Pariſh of Stillington, in the North Riding of Yorkſhire. 33 *Geo. III. Ch.* 99.

THIS navigation proceeds from the junction of the river Foſs with the river Ouſe at York, its courſe is the river Foſs as far as Farlington Common, from thence by a new cut to the Lordſhip of Marton, and from there to deepen, &c. the river Foſs to Stillington Mill. The total length is between twelve and thirteen miles.

The

River Foſs Navigation.

The proprietors are incorporated by the name of "The *Foſs Navigation* Company," with powers neceſſary for conſtructing the ſame. A reſervoir may be made on Oulſton Moor. All roads made by this company, are to be conſidered as public roads. The breadth of ground allowed for the canal, &c. is thirty yards.

The company are authoriſed to raiſe the ſum of 25,400l. and a further ſum of 10,000l. if neceſſary, to be divided into ſhares of 100l. each.

The *rates* allowed to be taken are—

For every chaldron (containing thirty-two Wincheſter buſhels) of lime, coal, fleck, cinders or culm, *two-pence* per mile.

For all dung, ſoot, rape duſt, and other manure; wheat, rye, oats, barley, beans, malt, hay ſeeds, rape ſeed, muſtard ſeed, linſeed, and other grain and ſeeds of all ſorts, oatmeal, flour, oat ſhilling, ſtock and common bricks, ſquare paving bricks, or tiles, oak, aſh, and other timber, oak bark, or other articles of wood; ſtone, flags, and ſlate, bar iron, or manufactured iron, butter, bacon, cheeſe, ſalt, hay, ſtraw, and wool, *two-pence* per ton per mile.

For all other goods, wares, merchandize, &c. *three-pence* per ton per mile.

Boats, which from the junction, do not paſs Monk Bridge, laden with coal, corn, lime-ſtone, timber, goods, wares, &c. to pay ſuch additional rates as the company ſhall think proper, ſo that the ſame do not exceed the ſums before granted.

For

River Foſs Navigation.

For *wharfage*, goods remaining more than twenty-four hours, a reaſonable compenſation ſhall be made. Veſſels under twenty-five tons not to paſs any lock without leave, or paying that tonnage.

Part of this Act is intended for the better draining the low grounds, on each ſide the river Foſs; for this purpoſe commiſſioners are appointed, with the requiſite powers as well for making drains, ſewers, &c. as for enforcing due payment for the ſame, and adjuſting the claims of land, and payment of rates, &c.

Glouceſter and Berkley Canal.

GLOUCESTER AND BERKLEY CANAL.

An Account of a Canal from the River Severn, at Berkley Pill, to the City of Glouceſter. 33 *Geo. III. Ch.* 97.

THIS canal joins the Severn, at a brook called Berkley Pill, oppoſite the town of Berkley; from whence in a ſtraight courſe it paſſes Slimbridge, Frampton, Weatenhurſt, (where it interſects the Stroud canal) Hardwick, Quedgley, and terminates on the ſouth ſide of the city of Glouceſter; making a line of eighteen miles and a quarter. There is a ſhort cut to the town of Berkley; the whole is level; there are locks at the two extremities for preſerving the water.

The proprietors of this canal are incorporated under the name of "The *Glouceſter and Berkley Canal* Company," and have the cuſtomary powers for making and maintaining the canal,

canal, &c. It is enacted that the canal be made ſeventy feet wide, and fifteen feet deep, at the laſt, and kept properly cleanſed, ſo as at all times to admit veſſels of three hundred tons burthen and upwards, to navigate without interruption. The breadth of ground allowed for the canals, towing path, ditches, &c. is ſeventy yards. Not leſs than thirty-eight years purchaſe is to be given for the land taken for the uſes of the canal, &c.

Glouceſter and Berkley Canal.

The proprietors are authoriſed to raiſe the ſum of 140,000l. to be divided into ſhares of 100l. each, no perſon to hold more than thirty ſhares, unleſs the ſame come by act of law; if the former ſum be inſufficient, proprietors may raiſe a further ſum of 60,000l. The company before the canal is begun, are to pay five thouſand pounds into the hands of four truſtees, who are to depoſite the ſame in the bank of England, to anſwer demands of ſatisfaction for damages, &c.

The *rates of tonnage* allowed to be taken are

For all goods, wares, and merchandize, carried through all or any part of this canal, in any veſſel of one hundred tons or upwards, or in any keel veſſel of any burthen whatſoever, *five ſhillings* per ton.

For all goods, wares, and merchandize (except coals) carried upon all or any part of this canal, in trows, barges, boats, &c. (except keel veſſels) of leſs burthen than one hundred tons, *two ſhillings and ſix-pence* per ton.

For coals of every denomination, carried in trows, barges, &c. *one ſhilling* per ton.

For

Glouceſter and Berkley Canal.

For all goods, wares, merchandize, &c. not paſſing through either of the locks of the canal, *three-pence* per ton per mile, and ſo in proportion.

For all ſhips, trows, boats, &c. entering into or going out of the canal at either end, empty or in ballaſt, *one penny* per ton for lockage.

Fractions to be taken, as for a quarter of a ton.

In order to prevent the company being defrauded of the tonnage they are entitled to take, they are authoriſed to receive for all goods, wares, &c. which ſhall be brought into the river Severn, in veſſels of one hundred tons burthen or upwards, or in keel veſſels of any burthen, and afterwards brought into the canal in other veſſels, the ſame tonnage as ſuch goods, &c. would have paid, if the ſame had been brought into the canal in ſuch veſſels of one hundred tons, &c.

Exemption from rates, all ſtone, gravel, and ſand, for making or repairing of roads, not exceeding the diſtance of two miles from the canal: and all dung, ſoil, marl, aſhes of coal and turf, lime for manure, and all other manure for the improvement only of lands not exceeding three miles from the canal; ſo that more than one veſſel do not paſs any lock in twenty-four hours.

Veſſels under twenty tons burthen, not to paſs any lock, without conſent, or paying that tonnage.

The *rates of tonnage* to Berkley are
For all coal, *three-pence* per ton.

For all goods, wares, &c. *one ſhilling* per ton. Glouceſter and Berkley Canal.

The company are to make and keep in repair, a wharf at the end of the cut near Berkley; but the dues for wharfage, &c. belong to the perſon on whoſe land the ſame ſhall be. The pretext of landing goods at Berkley, is not to prevent the company receiving their juſt rates.

No water for this canal is to be taken from the Stroud water canal, or Stroud water river, or any ſources which ſupply the ſame; and in order to prevent loſs of water from the Stroud canal, this company are to erect ſufficient gates, where the canals interſect.

All coals, goods, wares, &c. paſſing on this canal, and to or from Walbridge, on the Stroud canal, or any intermediate part, ſhall pay the ſame tonnage to the Stroud company, as ſuch goods, &c. would have paid if they had been carried to or from the river Severn, at Framiload.

Alſo all coals, goods, wares, &c. coming up or going down the Stroud canal, and into or out of this canal or any part thereof, ſhall pay only half the tonnage the ſame would have paid for paſſing the whole length of this canal.

No dues to be taken for boats croſſing either canal, and a gate keeper is to be appointed. Whenever the navigation of the Stroud canal is interrupted by any works, &c. belonging to this canal, a compenſation of five guineas per day is to be paid to the Stroud company; and further, a compenſation is to be made for ſuch interruptions to the Thames and Severn canal company of two thirds, of loſs per day, to be averaged

Glouceſter and Berkley Canal.

from the ſix preceding months. One month's notice to be given to the Thames and Severn company, of ſuch interruption; and the ſame to be advertiſed in the Briſtol and Gloſter news papers, that all perſons intereſted in the Thames and Severn canal may be informed thereof.

This undertaking for its magnitude and accommodations, deſerves to be conſidered as of the firſt importance; its magnitude is intended for the paſſage of veſſels of more than three hundred tons burthen; and its accommodations to commerce, by uniting the city of Glouceſter, by an eaſy and certain water carriage with the port of Briſtol, and from thence with all the world, may juſtly be deemed an object of great magnitude to trade. The whole of this ſcheme evinces an extent of idea, known only in a free country; and an ardour of enterpriſe, which none but an induſtrious and commercial people could endure.

By the canal the voyage may with eaſe be performed in one day, whereas to get to Glouceſter by the river was a work of many, though the diſtance was only ten miles more. Aſk any merchant the advantages of a quick and certain conveyance of his goods to Market?

GRAND

GRAND JUNCTION CANAL.

Grand Junction Canal.

Deſcription of the Courſe of a Canal from the Oxford Canal, at Braunſton, in the County of Northampton, to the River Thames, at Brentford, in the County of Middleſex, with collateral Cuts to Daventry, Northampton, Old Stratford, and Watford. 33 *Geo. III. Ch.* 80. *With Branches alſo to Buckingham, Ayleſbury, and Wendover.* 34 *Geo III. Ch.* 24.

I SHALL deſcribe the courſes of this canal, beginning at that extremity which joins the Oxford canal, at Braunſton, in Northamptonſhire, on the borders of Warwickſhire, the whole canal lays nearly north-weſt by ſouth-eaſt. From Braunſton after paſſing a tunnel, its courſe is ſoutherly between Welton and Daventry, with a cut of one mile and a half to the latter place. Then leaving Long Buckley to the left, it paſſes through Weedon, by Lower Heyford, Bugbrook, to Gayton, where the cut five miles long branches off to Northampton. From Gayton it paſſes Bliſworth, whence through a tunnel it reaches Stoke, paſſes Grafton and Coſgrove, a little below which a branch of one mile and a half goes to Stoney Stratford, below this junction it croſſes the river Ouſe, and bending eaſtward paſſes Great Dinford, and is diſtant about a mile from Newport Pagnell, its courſe is again ſouth, and paſſes Little and Great Wolſton, Woughton, Simpſon, through the town of Fenny Stratford, by Stoke Hammond, Soulbury, Linſlade, Leighton Buzzard, Marſworth, Ivinghoe, Pittleſhorn, Tring, diſtant one mile and a half, Aldbury, Northchurch, cloſe to Berkhamſted, Hemel Hempſted, diſtant about a mile,

Grand Junction Canal.

and Kings Langley, after which paſſing a ſmall tunnel, it goes by Grove Park, and Caſhiobury Park, and arrives at Rickmanſworth, about a mile before which, a branch of two miles goes to Watford, from Rickmanſworth it goes to Uxbridge, running parallel with the river Coln, which ſeveral times it croſſes, from Uxbridge it paſſes Cowley and Hillingdon, to the weſt; and Drayton, Harlington, Cranford Park, Norwood and Oſterley Park, to the eaſt; where interſecting the river Brent, it falls into the Thames between Brentford and Sion Houſe; completing a courſe of ninety miles, paſſing one hundred and twenty-one locks, with ſeven hundred and ninety-ſix feet lockage; and going through three tunnels.

The lockage and diſtance may be more particularly divided thus,

From the junction with the Oxford canal to near Braunſton Mill, not quite a mile, thirty-ſeven feet riſe. From thence through the tunnel which is near one mile, to above Whilton Mill, and below the road from Daventry to Long Buckly, is four miles and a quarter, and level. From thence below the road from Daventry to Whilton, is five furlongs, five chains, with ſixty feet fall. From thence to Stoke is thirteen miles and a half, and level. Between Bliſworth and Stoke, is a tunnel about one mile and a half long. From Stoke to the junction with the branch to Stratford, is ſix miles and a half, with one hundred and twelve feet fall. From thence to Marſworth, above Tring, is twenty-five miles, with one hundred and ninety-two feet riſe. From Marſworth to Cow Roaſt, is three miles and three quarters, and level. This is the lighteſt level in the whole courſe of the canal, and is about twenty feet higher than the level of the tunnel at Braunſton,

and

and is four hundred feet higher than the level of the Thames, in pretty regular deſcent. From Cow Roaſt to Two Waters, near Hemel Hempſted, is near ſeven miles, with one hundred and twenty-ſeven feet fall. From thence to Langley Bury below Kings Langley, is four miles and three quarters, and level, including the tunnel which is not quite half a mile. From thence to the junction with the Thames, is near twenty-four miles, with two hundred and ſixty eight feet fall; of which about ſixty feet is by the ſide of Oſterly Park.

Grand Junction Canal.

The cut to Daventry has ſixty feet riſe; that to Northampton has one hundred and twenty feet fall; that to Stratford has one lock up; and the cut to Watford is level.

The proprietors of this canal are incorporated under the title of "The Company of Proprietors of *The Grand Junction Canal*," and have powers to conſtruct, make, &c. the main canal, and the ſeveral cuts before mentioned.

The ground allowed in all ordinary caſes for the canal, towing path, &c. is twenty yards; but where deep cutting, baſins, warehouſes, &c. are neceſſary, forty-five yards may be taken. The canal not to deviate more than one hundred yards from the line laid down in the book of reference. Land owners may become proprietors if they deſire it, provided one eighth part of a mile in length or more is cut through, taken or uſed, and ſo in proportion, one ſhare for every eighth part of a mile, not exceeding ten ſhares. If land owners decline, leſſes may become proprietors.

The towing-path through Oſterley Lands, the lands of John Robinſon, eſq. the duke of Northumberland, and James Clitherow

Grand Junction Canal.

Clitherow, eſq. is to be on the north, north-eaſt, and eaſt ſide of the canal; nor is any water to be taken or diverted from thoſe lands for the uſe of the canal. Reſervoirs are to be provided for ſupplying the rivers Gade, Colne, and Bulborne, with as much water as ſhall be taken for the uſe of the canal. An equal quantity of water is to be returned to the river Brent as ſhall be taken from it. The waſte water from the ſummit level at Marſworth is to be conveyed to the ſouthward. The navigation of the river Brent is not to be impeded, nor the acceſs of owners of wharfs, warehouſes, &c. interrupted, nor liable to the payment of any rates or tolls, not even the city duty of one halfpenny per ton. This exemption to be conſidered as reaching no further, than from the Thames to Bax's Mill; which mill is alſo to be guarded from injury. The pipes which ſupply water to Uxbridge and Hillingdon are not to be damaged.

The water of the canal is forbidden to have any communication with the river Colne between the Point and Uxbridge; and the water of the canal is to be conveyed over the river in aqueducts, of height ſufficient to permit the river to flow freely. This is for the protection of the ſeveral mills which lie above the Point; the ſurplus water between Uxbridge and the river Brent, is to be conveyed into Cranford Brook. The canal is not to communicate with the Colne, below Uxbridge, but ſhall be carried acroſs in aqueducts. And to preſerve the water of the ſame river, a tumbling bay is to be erected above the Point. No water to be taken from the ſtream which ſupplies Smewne's paper-mill at Soulbury, in Bucks. No water to be taken from any ſtreams, &c. which flow into the Thames and Iſis above Dorcheſter-bridge, unleſs the company

ſhall

ſhall make ſufficient reſervoirs to ſupply the quantity taken. All the ſoil dug in making this canal is to be well and properly ſpread upon the adjoining grounds, ſo as to be fit for culture and huſbandry, at the expence of the company. Grand Junction Canal.

For the purpoſes of this Act the company are authoriſed to raiſe the ſum of 500,000l. to be divided into ſhares of 100l. each, and for which a ticket with the number and having the common ſeal of the company ſhall be given, paying the clerk two ſhillings and ſix-pence; and if the above ſum is found inſufficient, may raiſe a further ſum of 100,000l. There are to be two general meetings annually, viz. on the ſecond Tueſday in May and November, at ſuch place as ſhall be appointed, and notice given by advertiſement: at ſuch meeting ſhall be choſen a general committee, to conſiſt of twenty-one perſons, (five ſhares a qualification) and ſuch other committees as may be deemed neceſſary, to conſiſt of nine perſons. At every general aſſembly or meeting, there muſt be preſent perſons poſſeſſed of one thouſand ſhares.

The *rates of tonnage* are not to exceed—

For lime and lime-ſtone *one farthing* per ton per mile

For all cattle, ſheep, ſwine, and other beaſts, all flint, and other ſtones; all bricks, tiles, ſlates, ſand, and fuller's earth; all iron ſtone, pig iron, and pig lead, and all kinds of manure (except lime) *one halfpenny* per ton per mile.

For coal and coak *three farthings* per ton per mile.

For all other goods, merchandize, &c. *one penny* per ton per mile.

Exemption from rates. Officers or ſoldiers upon their march, with their horſes, arms, or baggage. Timber for the

Grand Junction Canal.

uſe of the king's navy, or any ſtores, &c. belonging to his majeſty's naval or military ſervice; the perſons having ſuch things in charge to produce a proper certificate from the navy or ordnance boards; alſo, gravel, and ſand for making or repairing any public roads. Provided the ſame do not paſs any lock but when the water ſhall flow over the waſte weir.

Goods, &c. laying on *wharfs*, &c. more than twenty-four hours, to pay a reaſonable allowance for the ſame.

The navigation to be free on paying the rates, &c. and open between the hours of ſeven and five in the months of November, December, January, and February, between the hours of five and ſeven in March, April, September, and October, and between the hours of four and nine in May, June, July, and Auguſt; and provided that no boat of leſs than ſixty feet long and twelve feet broad, or of leſs than thirty tons burthen, do paſs any lock without conſent, unleſs the water ſhall flow over the waſte weir, or paying for thirty tons; unleſs there ſhall not be ſufficient depth of water in the locks, then to pay for no more than the water will enable to carry. All fractions of a mile to be deemed as a mile, but fractions of a ton, to pay in proportion of the quarters of a ton.

Exemption. Owners of land through which the canal paſſes, for their own uſes only, are allowed to carry free of tolls, dung, marle, ſoil, or compoſt (lime and lime-ſtone excepted;) but if the ſame paſs any lock, then to be liable to the cuſtomary rates.

By agrement between the Oxford Canal Company and the proprietors of this canal, it is enacted that the following *rates* only ſhall be demanded, viz.

For

Grand Junction Canal.

For all coal which ſhall paſs from the Oxford canal into this canal *two ſhillings and nine pence* per ton, and ſo in proportion for leſs than a ton, without any regard to the diſtance, the ſame ſhall paſs on the Oxford canal.

For all goods, wares, &c. which ſhall paſs from or to any navigable canal into or out of the Oxford canal, and into or out of this canal (except lime and lime-ſtone, and all ſuch articles and things as are exempted from paying tolls to the Oxford Canal Company,) *four ſhillings and four-pence* per ton, and ſo in proportion for a leſs quantity, and without any regard to diſtance.

And whereas it is apprehended, that making this Grand Junction Canal, will be injurious to the Oxford Canal Company, it is agreed, that if the tolls above-mentioned do not amount to the ſum of 5,000l. in any year after this canal ſhall be completed, from the ſaid Oxford canal to Old Stratford; then the deficiency of that ſum ſhall be made good by this company; and further, if it ſhall happen that after this canal ſhall be completed from the Oxford canal to the river Thames, or after the firſt day of January, 1804, the rates before-mentioned ſhall not produce to the Oxford Canal Company the ſum of 10,000l. in any year, the deficiency of ſuch ſum ſhall be made good by this company, within three months after the expiration of the year; provided the Oxford Company keep their canal always in good condition.

The toll of one halfpenny per ton due to the city of London, upon all veſſels navigated on the Thames to the weſtward of London, is to be collected by this canal company, in addition to all other tolls, on all veſſels going into or out of the ſaid canal; and the ſaid company are to pay to the city of

Grand Junction Canal.

London, for the better improvement of the navigation of the river Thames, an additional rate of one halfpenny per ton, upon all goods which ſhall paſs into or out of this canal.—And it is further enacted, that if the ſaid toll of one halfpenny per ton granted heretofore to the city of London, and the additional toll of one halfpenny per ton, granted by this act, ſhall not amount to 200l. from April 30, 1790, to Midſummer 1795, and to 500l. in 1796, and to 600l. in 1797, and to 700l. in 1798, and to 800l. in 1799, and to 900l. in 1800, and to 1000l. in 1801, and every ſubſequent year, and if the ſaid tolls do not produce the ſums above ſpecified, the ſame is to be made good by this company.

No coals, culm, or cinders, are to be conveyed by this canal nearer to London than the mouth of the Tunnel at Langley Bury, on penalty of 50l.

By an act of the ſucceeding ſeſſion viz. 34 Geo. III. chap. 24. The *Grand Junction Canal Company* are empowered to make a cut from the town of Buckingham to join the branch of the canal at Old Stratford; alſo a cut from the town of Ayleſbury, to join the canal at Marſworth, which is about two miles above Tring. And alſo to make navigable the cut or feeder from the town of Wendover, to join the canal at Bulbourne; which is about one mile above Tring; with all the powers for making the ſame granted by the preceding act.

Mr. Sheppard, of Thornton, in the county of Bucks, or the occupyer, is allowed to uſe pleaſure-boats and to paſs the lock or locks at Thornton Mill near adjoining, without paying any rates of tonnage.

Grand Junction Canal.

This act alſo contains ſome further regulations reſpecting the management of the affairs of the company, viz. reſpecting Proxies; the day of annual meetings; the forfeiture of ſhares; the claim of land owners to ſhares; and alſo reſpecting the ſale or transfer of ſhares; enacting, that from and after the firſt day of June, 1794, no transfer of any ſhare ſhall be valid, unleſs the deed of transfer ſhall be prepared by the clerk of the company, and executed in the preſence of ſuch clerk, or his deputy, appointed under his hand writing; and if the parties cannot attend as aforeſaid, then to be executed by his attorney, lawfully conſtituted; the clerk to receive for his trouble of preparing and executing ſuch transfer completely, no more than *ten ſhillings*: alſo every letter of attorney ſhall be prepared in like manner by the clerk, and ſhall be executed in the preſence of two witneſſes, and for preparing which, and filing the ſame, no greater fee ſhall be paid than *two ſhillings and ſix-pence*; and every ſuch transfer as aforeſaid ſhall be executed at the principal office of the ſaid company.

I have been more particular in deſcribing the courſe and particulars of this canal as well for the great advantages expected to be derived from it, as for the great number of perſons concerned in it either as proprietors or land owners, and for the great intereſt the metropolis is ſuppoſed to have in it; its courſe is altogether through a line of country populous and well cultivated; and the advantages to be derived, are expected to be, many and great, as well to the ſeveral places on the line, as to the city of London. This canal of ninety miles, by collecting the various produce of the heart of the kingdom, ought and no doubt will accumulate benefits ſufficient to be ſenſibly felt by the inhabitants of the metropolis.

Grand Junction Canal.

London, for the better improvement of the navigation of the river Thames, an additional rate of one halfpenny per ton, upon all goods which ſhall paſs into or out of this canal.—And it is further enacted, that if the ſaid toll of one halfpenny per ton granted heretofore to the city of London, and the additional toll of one halfpenny per ton, granted by this act, ſhall not amount to 200l. from April 30, 1790, to Midſummer 1795, and to 500l. in 1796, and to 600l. in 1797, and to 700l. in 1798, and to 800l. in 1799, and to 900l. in 1800, and to 1000l. in 1801, and every ſubſequent year, and if the ſaid tolls do not produce the ſums above ſpecified, the ſame is to be made good by this company.

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Grand Junction Canal.

This act alſo contains ſome further regulations reſpecting the management of the affairs of the company, viz. reſpecting Proxies; the day of annual meetings; the forfeiture of ſhares; the claim of land owners to ſhares; and alſo reſpecting the ſale or transfer of ſhares; enacting, that from and after the firſt day of June, 1794, no transfer of any ſhare ſhall be valid, unleſs the deed of transfer ſhall be prepared by the clerk of the company, and executed in the preſence of ſuch clerk, or his deputy, appointed under his hand writing; and if the parties cannot attend as aforeſaid, then to be executed by his attorney, lawfully conſtituted; the clerk to receive for his trouble of preparing and executing ſuch transfer completely, no more than *ten ſhillings*: alſo every letter of attorney ſhall be prepared in like manner by the clerk, and ſhall be executed in the preſence of two witneſſes, and for preparing which, and filing the ſame, no greater fee ſhall be paid than *two ſhillings and ſix-pence*; and every ſuch transfer as aforeſaid ſhall be executed at the principal office of the ſaid company.

I have been more particular in deſcribing the courſe and particulars of this canal as well for the great advantages expected to be derived from it, as for the great number of perſons concerned in it either as proprietors or land owners, and for the great intereſt the metropolis is ſuppoſed to have in it; its courſe is altogether through a line of country populous and well cultivated; and the advantages to be derived, are expected to be, many and great, as well to the ſeveral places on the line, as to the city of London. This canal of ninety miles, by collecting the various produce of the heart of the kingdom, ought and no doubt will accumulate benefits ſufficient to be ſenſibly felt by the inhabitants of the metropolis.

Grantham Canal.

GRANTHAM CANAL.

Deſcription of a Canal from Grantham, in the County of Lincoln, to the River Trent, between Holme Pierrepont and Ratcliffe, near Nottingham Trent Bridge, in the County of Nottingham, with a collateral Cut to Bingham. 33 *Geo III. Ch.* 94.

THIS canal commences on the eaſt ſide of Grantham, paſſes Harlaxton, the Point, at the foot of Woolſthorp Hill, Stainwith, Redmile, along Belvoir Vale, by Barkeſtone, Plungar, Harby, Long Clawſon, to Hickling, being from Grantham a courſe ſouth-weſt, from Hickling it bends to the north, and paſſes through Kinnoulton, Coulton Baſſet, Cropwell Biſhop, and joins the Trent between Holme Pierrepont, and Radcliffe. There is a branch from near Cropwell Biſhop to Bingham.

The length of this canal from Grantham to the river Trent is thirty miles, with one hundred and forty-eight feet fall to the river, viz. From Grantham to Woolſthorp Hill is five miles, and level. From thence to Stainwith Cloſe is one mile and three quarters, with fifty-eight feet and a half fall. From thence along Belvoir Vale to Cropwell Biſhop, is twenty miles, and level. From thence to the river Trent is three miles and a half, with eighty-nine feet and a half fall. The branch to Bingham is more than three miles, and level.

The undertakers of this ſcheme are incorporated under the name of "The Company of Proprietors of *The Grantham Canal*

Canal Navigation," and are impowered to make the canal, &c. No water to be taken from the feeders of the river Witham, except the flood waters of Denton Brook, which are to be turned into a reſervoir at Denton, occupying the ſpace of twenty acres, and three yards deep; this reſervoir will ſupply the head level. Another reſervoir is to be made between Branſtone and Knipton, not exceeding ſixty acres, this to receive only the flood waters of the river Devon, and ſuch other waters as can be collected within half a mile of the reſervoir, and never to be drawn down to leſs than nine feet depth of water; both theſe reſervoirs lay on the ſouth ſide of the canal. The depth of water in the ſummit level is to be always five feet, unleſs the reſervoir at Denton renders it neceſſary to ſupply but four feet. In paſſing the pariſhes of Woolſthorpe, Stainwith, Muſton, Bottesford, and Redmile, the canal is not to deviate more than fifty yards from the line laid down in the book of references, without leave of the Duke of Rutland; in all other caſes one hundred yards deviation are allowed. The land to be taken for the canal, towing path, &c. is not to exceed twenty-four yards in breadth. Grantham Canal.

The company are authoriſed to raiſe the ſum of 75,000l. to be divided into 100l. ſhares, no perſon to have leſs than one ſhare, or more ten. If the above ſum is not ſufficient, may raiſe 30,000l. more; of which 20,000l. may be by new ſhares; a holder of ten former ſhares, may hold five of theſe. The remaining 10,000l. to be raiſed by mortgage. A deed to be given proprietors for each ſhare.

The allowed *rates of tonnage* are—

For all coals, ſtones, timber, corn, grain, malt, meal, flour, and other goods, wares, &c. *two-pence halfpenny* per ton, on entering

Grantham Canal.

entering into, or paſſing out of this canal, at its junction with the river Trent.

And *three halfpence* per ton per mile for navigating the ſame on the canal, *except* all dung, ſoil, marle, aſhes, and other manure, and gravel, ſtone, or other materials for mending public or private roads, which ſhall paſs toll free; lime excepted, which ſhall pay half the tolls.

Exemption, That Charles Pierrepont and John Muſters, eſq. and the other proprietors, their heirs and tenants of eſtates within the pariſhes of Nottingham, Weſt Bridgeford, Adbolton, Gamſton, Baſſingfield, Cotgrave, Clipſton, and Cropwell Butler, whoſe lands the ſaid canal ſhall paſs through, between the firſt day of November and the firſt day of May, yearly, ſhall be exempted from the groſs tonnage of *two-pence halfpenny*, charged on entering into or paſſing out of the canal, at the junction with the river Trent, on all goods, wares, &c. which ſhall be for their own private uſe, and not for ſale; and navigated only between the Trent and Hollowgate Lane, in the Lordſhip of Cotgrave.

And in caſe an Act of Parliament ſhall be obtained for making a canal from Newark, the ſame may be made to communicate with this canal at any place within the diſtance of four miles, weſtward of the loweſt lock in the pariſhes of Stainwith or Muſton; and the following *groſs tonnage* may be taken, in lieu of that taken at the junction with the Trent.

For all coals paſſing into or out of this ſaid intended canal, *one ſhilling* per ton.

For

For all goods, wares, &c. paſſing into or out of the Grantham canal eaſtward, *four-pence* per ton; and paſſing weſtward *two-pence halfpenny* per ton. Grantham Canal.

For all lime, paſſing eaſtward or weſtward as aforeſaid, *one-penny farthing* per ton.

Exemption, dung, ſoil, marle, and other manure; alſo ſtone, gravel, ſand, and other materials, for the repair of roads, are free from the above tonnage.

The rates for *wharfage* are, *one penny* per ton for not exceeding twenty-four hours; and *one penny* per ton per week, for every week after; and *three-pence* per ton for all goods, &c. which ſhall be houſed at requeſt.

The divided profits on this undertaking are not to exceed eight per cent, and after the accumated ſurplus ſhall exceed 3,000l. the rates, &c. are to be lowered.

The proprietors of the river Trent navigation are ſo to lower the bed of that river, that at the drieſt ſeaſon there ſhall be thirty inches depth of water, between the Nottingham canal and this canal, and between Nottingham Trent Bridge, and this canal; and as a recompence for the ſame, as well as an indemnification for any loſs of tonnage they may ſuſtain, by the making of this canal, the Trent company are authoriſed to take the following *tolls*, viz.

For every ton of goods, wares, &c. which ſhall be carried into or out of the Grantham canal, and navigated on the river Trent, between the Nottingham canal, and Nottingham Trent Bridge, *three-pence*.

For

Grantham Canal.

For lime only half the above tolls ſhall be paid.

And ſtone, gravel, ſand, &c. for repairing of roads; alſo dung, ſoil, marle, or other manure ſhall *go free*.

No boat to paſs any lock on this canal without conſent, unleſs the ſame pay for thirty tons, or the water ſhall flow over the waſte weir, or the boat ſhall be returning from taking a load greater than thirty tons.

The towing path of this canal may be uſed by occupiers of lands as a bridle-way, or drift-way for their cattle.

The making of this canal will be a great accommodation to the town of Grantham; coal, lime, &c. by the Cromford and Nottingham canals, will have a cheap carriage; and on corn, timber, and many other articles the difference of carriage muſt be very great, and the ſavings of conſequence in proportion.

Hereford and Glouceſter Canal, to Alter.

HEREFORD AND GLOUCESTER CANAL, TO ALTER.

AN Act has been obtained this Seſſion, 33 Geo. III. Ch. 119. enabling the company to alter the line authoriſed to be made by virtue of the Act, 31 Geo. III. for which ſee page 2, of the former Appendix.

The principal alteration intended, is to bring the line (by means of a tunnel, through the high ground about Oxenhall,) from Dimmock by Oxenhall, Newent, Taynton, Tibberton, and Rudford; by which a great circuit of canal, and the collateral

lateral cut to Newent will be ſaved; for this purpoſe any water within three hundred yards may be taken for the uſe of the tunnel, &c. and all the waſte water is to be turned into Newent brook, and from thence into the river Leadon. The other alteration is to ſhorten the canal, by reducing the bend which the canal was intended to make, at croſſing the river Lugg at Sutton St. Nicholas, and Shelwick. The canal alſo is to be continued cloſer to the town of Hereford, to near a place called Byſters Gate.

Hereford and Glouceſter Canal, to Alter.

The clauſe reſpecting goods paſſing between Hereford and Ledbury, paying tonnage for half a mile leſs than the actual diſtance, is repealed; and the actual diſtance is to be paid for as is uſual.

LANCASTER CANAL, TO EXTEND.

Lancaſter Canal, to Extend.

BY the Act obtained 33 Geo. III. Ch. 107. which is an addition to the former Act, the proprietors are enabled to make a cut from the Dock at Glaſſon, at the mouth of the river Loyne, to communicate with the canal at Galgate, which is about ſix miles to the ſouth of Lancaſter; this cut will be about four miles long, and has an immediate communication with the ſea; the ſame rates of tonnage are allowed as on the main line.

By this Act the company are reſtricted from taking any water from the river Loyne, except for ſuch uſes and purpoſes as may be requiſite in erecting an aqueduct over the ſaid river. Are alſo reſtricted from taking water from the river Wyer.

Lancaſter Canal, to Extend.

May have the water from mines within two thouſand yards of the canal, without paying any recompence; and water raiſed by fire engines, is to be given for the uſes of this canal.

The aqueduct on this canal over the river Lune near Lancaſter, will be the greateſt thing of the kind in England, perhaps in Europe; it will conſiſt of five arches, ſeventy feet ſpan each; and is nearly completed.

Mancheſter and Oldham Extenſion.

MANCHESTER AND OLDHAM EXTENSION.

Particulars of an Act for allowing the Mancheſter and Oldham Canal Proprietors, to extend the ſaid Canal, &c. 33 *Geo. III. Ch.* 21.

THIS Act enables the Mancheſter and Oldham canal company to make and maintain a canal navigable for boats, barges, &c. from the ſaid Mancheſter and Oldham canal, at Clayton Demeſne, in the pariſh of Mancheſter, to oppoſite the Three Boars Heads at Heaton Norris, near Stockport, which diſtance is about ſix miles, and parallel with the high road. Alſo to continue this canal northward, from a place called Taylors Barn, to Denton, a diſtance of about three miles. Alſo from the aqueduct near the Water Houſes on the Oldham branch, to make a canal to Stake Leach, at Hollinwood, a diſtance of about two miles.

This Act conſolidates the proprietors of this undertaking with thoſe of the Mancheſter and Oldham canal company, and give the uſual powers for completing the cuts; but not to

deviate more than one hundred yards from the lines laid down in the book of reference. Manchester and Oldham Extension.

For the purpoſes of this Act, the company may raiſe the ſum of 30,000l. to be divided into ſhares of 100l. each, no perſon to hold more than thirty ſhares, unleſs the ſame come by will, &c.

The *rates of tonnage* to be the ſame, and under the ſame regulations as thoſe on the Mancheſter and Oldham canal, authoriſed by 32 Geo. III. for which ſee the former Appendix, page 21.

NUTBROOK CANAL. Nutbrook Canal.

Deſcription of a Canal from Weſt Hallam and Shipley, in the County of Derby, to the Erewaſh Canal, near Stanton. 33 *Geo. III. Ch.* 111.

THIS canal commences at the Shipley and Weſt Hallam colleries, and proceeding by Kirk Hallam joins the Erewaſh canal, near Stanton. The length is about five miles, and may be conſidered as the private property of Sir Henry Hunloke, bart. and Edward Miller Mundy, eſq. the owners of the above mentioned colleries.

This canal is to be called the *Nutbrook Canal*, and the proprietors have powers for making the ſame, in the uſual way. The land allowed for the canal, towing-path, &c. is twenty yards in breadth.

Nutbrook Canal.

The proprietors may raiſe the ſum of 13,000l. by ſubſcriptions, to be divided into ſhares of 100l. each; 6,500l. more may be raiſed if the firſt ſum is not ſufficient. The buſineſs of the canal is under the controul, &c. of a committee as is uſual.

The allowed *rates* are not to exceed,

For all coal and coak navigated on this canal, and not navigated on the Erewaſh canal, *four-pence* per ton.

For all coal, got within the Liberties of Shipley and Weſt Hallam, navigated on this canal and on the Erewaſh canal, *eight-pence* per ton.

For all coal got within the Liberties of Mapperley, Kirk Hallam, Ilkeſton, and Little Hallam, navigated on this canal, and alſo on the Erewaſh canal, *one-penny* per ton.

For all other goods, wares, &c. *eight pence* per ton.

Exemption, Earl Stanhope, or the tenants of his eſtates in the pariſhes of Stanton by Dale, and Dale Abbey, may carry on this canal, free of all rates, any iron-ſtone that ſhall be got within the lordſhips of Shipley, Mapperley, Weſt Hallam, Kirk Hallam, Ilkeſton, and Little Hallam, and uſed within the ſaid pariſhes of Stanton by Dale and Dale Abbey; and alſo to navigate on that part of this canal, which is within the ſaid two pariſhes, free of all rates, any iron, which ſhall be made, and any coal, coak, and iron-ſtone that ſhall be got within the ſaid two pariſhes, or that ſhall be brought from the Erewaſh canal, and all other goods, wares, and articles whatſoever.

Alſo, in order that the coal which ſhall be got within the ſaid lordſhips of Shipley, Weſt Hallam, &c. may be taken to market at an equal expence; it is, provided that if the tonnage of the ſaid coal navigated on the Erewaſh canal, ſhall be reduced to *one ſhilling and three-pence* per ton, the proprietors of

of this canal may then take for coal got in the ſaid pariſhes, and navigated on this canal and on the Erewaſh, *two-pence* per ton; and if the rates on the Erewaſh are reduced to *one ſhilling and two-pence*, then to take *three-pence*; if reduced to *one ſhilling and a penny*, to take *four-pence*; if reduced to *one ſhilling*, to take *five-pence*; if reduced to *eleven-pence* to take *ſix-pence*; if reduced to *ten-pence* to take *ſeven-pence*; if reduced to *nine-pence or leſs* to take *eight-pence*. Nutbrook Canal.

Wharfage for more than twenty-four hours, to be a reaſonable allowance.

The divided profits on this concern, are not to exceed eight per cent.

Proprietors of adjoining grounds may make ſide cuts.

The primary benefits of this canal will ariſe to the two colleries of Shipley and Weſt Hallam, but ultimately the public muſt be benefited, by opening an eaſy communication with ſuch abundant ſtocks of an article, in univerſal requeſt.

OAKHAM CANAL.

Oakham Canal.

Deſcription of a Canal from Melton Mowbray, in the County of Leiceſter, to Oakham, in the County of Rutland. 33 *Geo. III. Ch.* 103. *Surveyed by C. Staveley, jun. W. Joſſop, Engineer.*

THIS canal commences at and joins the Melton Navigation, on the ſouth ſide of the town of Melton, and proceeding on the north ſide of the river Eye, paſſes Brentingby, Wiverby, Stapleford, Saxby, Wymondham, Edmondthorpe, Teigh, Market Overton, Barrow, Cotteſmore, Burley, and joins the town

Oakham Canal.

town of Oakham, on the north ſide; being a courſe of fifteen miles, with one hundred and twenty-ſix feet regular riſe, in the firſt eight miles and a half, that is to Edmonthorpe; from thence to Oakham is level; the reſervoir is on the weſt ſide of the canal, near Langham.

The proprietors of this canal are incorporated under the name of "The Company of Proprietors of the *Oakham Canal*," and have the cuſtomary powers neceſſary to making the canal, &c. the water of Scafford Dyke is preſerved to the mill, called the Two Eye Mill at Melton; the flood water only of Langham Brook is to be taken for the reſervoir; no water to be taken from the ſprings, &c. in the grounds of Lord Harborough, in Saxby and Wymondham, without returning a ſimilar quantity from the canal; nor any water to be taken from Thorpe Brook.

The land allowed for the canal, towing path, &c. is twenty yards broad. The towing path may be uſed as a bridle way, by occupiers of land. The rubbiſh dug up, is to be properly leveled on the adjoining grounds. The company are authoriſed to raiſe the ſum of 56,000l. to be divided into ſhares of 100l. each, for each of which a ticket ſhall be given on demand, paying to the clerk two ſhillings and ſix-pence; if the above ſum is not ſufficient, 20,000l. more may be raiſed.

The *rates of tonnage* are—

For all coals, *three-pence halfpenny* per ton per mile; ſo that the groſs amount of the ſame does not exceed in the whole *three ſhillings*.

For

For all iron, timber, coaks, and other goods, &c. *four-pence halfpenny* per ton per mile; ſo that the groſs amount does not exceed *four ſhillings*. Oakham Canal.

For all lime, lime-ſtone, and ſtones, to be uſed for building, and materials for paving and repairing roads, half the rates authoriſed to be taken for coals.

Exemption, owners of land through which the canal paſſes, may carry dung, ſoil, marle, aſhes of coal and turf, and all other manures (except lime) to be uſed on ſaid lands; alſo all materials for making, repairing, or paving any public or private roads, theſe are to be free of all tolls; provided the ſame do not paſs any lock, unleſs the water ſhall flow over the waſte weir, and to give twenty-four hours notice.

The *rates of wharfage* are to be ſettled by the commiſſioners.

The company are to pay Lord Winchelſea, the ſum of 15l. per annum, in lieu of his Lordſhip's dues on all coals ſold in the Manor of Oakham.

This canal is an extention of a beneficial ſcheme through a populous and well cultivated country, every accommodation of which muſt tend to ſpread benefits to the community at large: and the produce of all the northern canal may now have free acceſs to Oakham.

SHREWSBURY

Shrewſbury Canal.

SHREWSBURY CANAL.

Deſcription of a Canal from Shrewſbury to Rockwardine Wood, in the County of Salop, there to communicate with the Shropſhire Canal. 33 *Geo. III. Ch.* 113.

THIS canal commences on the eaſt ſide of Shrewſbury, and winding with the Severn paſſes Uffington, whence it runs parallel with the river Tern, and paſſes Upton Forge, Withington, Rodington, where it croſſes the river Roden, and after a little croſſes the river Tern at Long Mill, paſſes Langdon, Eyton, croſſes the Ketley Brook at Rockwardine Wood, and there joins the Donnington Wood and the Shropſhire canals. The total length is ſeventeen miles and a half; with one hundred and forty-ſeven feet riſe in the five miles between Langdon and Wombridge; the reſt is level.

The proprietors of this canal are empowered to purchaſe one mile and one hundred and eighty-eight yards of Mr. Reynolds's or the Ketley Canal, for the ſum of **840l.** being a moiety of the original coſt. The ſame afterwards to be conſidered as part of the Shrewſbury canal, the junction is formed at Wombridge, it muſt therefore be conſidered as a collateral cut. Mr. Reynolds to be charged *two-pence* per ton per mile for all goods which paſs on this canal; this not to affect goods which paſs on the Ketley canal only.

The proprietors of this canal are incorporated under the name of "The company of Proprietors of the *Shrewſbury Canal* Navigation

Navigation, with the cuſtomary powers for making the ſame. And allowing twenty-ſix yards for the breadth of the canal, towing path, &c. Shrewſbury Canal.

The proprietors are authoriſed to raiſe the ſum of 50,000l. to be divided into ſhares of 100l. each; and 20,000l. more if the former ſum is not ſufficient.

The *rates of tonnage* are not to exceed—

For all iron, iron-ſtone, coal, ſtone, timber, and other goods, *two-pence* per ton per mile, and ſo in proportion for leſs than a ton and leſs than a mile.

Alſo, for the tonnage of any of the above articles, which ſhall be conveyed on this line by rollers, inclined planes, or in any other manner than by water, *one-penny* per ton; but when the profits of this canal ſhall amount to eight per cent, then this rate ſhall ceaſe.

Exemption, all manure (except lime) but not to paſs locks when the water ſhall be half an inch under the weirs.

Boats with leſs than eight tons, to pay for that quantity, unleſs returning.

For *wharfage* exceeding ſix months, to make a reaſonable recompence.

The great abundance of coal and iron mines in the vicinity of this canal, make a cheap carriage to be particularly deſirable, as well for the benefit of the owners in bringing their property to market, as for advantage of manufacturers in having a ſupply regular and cheap; beſides which, the populous town of Shrewſbury is in immediate connection with this line.

Stratford Canal.

STRATFORD CANAL.

Deſcription of a Canal from the Worceſter and Birmingham Canal at King's Norton, to Stratford upon Avon, with Branches to Grafton Field and Tanworth. 33 *Geo. III. Ch.* 112.

THIS canal joins the Worceſter and Birmingham Canal at King's Norton, which is about ſix miles diſtance from Birmingham, and is, as far as that canal is, at preſent completed; from the junction it takes an eaſterly courſe to Yardley Wood Common, whence it bends to the ſouth, and paſſes Shirley-ſtreet, Monkford-ſtreet, Lapworth, Preſton Bagot, where it croſſes the river Alne, thence by Wootton, to the north ſide of Stratford: there is a branch by Billeſley to the Stone Quarries near Temple Grafton: and another to the quarries near Tanworth: the total length of the canal excluſive of the branches is twenty-four miles and a half with three hundred and nine feet fall to Stratford; which more particularly is as follows, from the junction at King's Norton to near Horkley Heath, is ten miles and level; from thence to near Lapworth Hall, is two miles and a quarter with one hundred and forty-ſeven feet fall; from thence to Preſton Green, is one mile and level; from thence to Preſton Mill, is one mile and three quarters, with ſeventy-ſix feet fall; from thence to Wilmcote is near ſix miles and level; from thence to Stratford is two miles and a half with eighty-ſix feet fall in the firſt mile; the reſt is level. The branch to Tanworth is near two miles and a half and level; that to Grafton Field is near four miles, with 20 feet riſe in the laſt mile and a half.

The

Stratford Canal.

The proprietors of this canal are incorporated by the name of "The Company of Proprietors of the *Stratford upon Avon Canal* Navigation," with the cuſtomary powers for making the ſame; and are allowed twenty yards in breadth for the canal towing-path, &c. The proprietors are authoriſed to raiſe for the purpoſes of this canal the ſum of 120,000l. to be divided into ſhares of 100l. each, and if that ſum is not ſufficient a further ſum of 60,000l. may be raiſed.

The *Rates for Tonnage and Wharfage* are not to exceed—

For all coal, coak, iron, iron ſtone, timber, and other goods, (except flag-ſtone, carried on that part of the canal which is between Salters-lane in the pariſh of Aſton Cantloe and Stratford and upon the branch to Grafton Field; and except coal for the purpoſe of burning lime on that part of the canal which is between Salters-lane and Copmaſs Hill, or upon the branch to Temple Grafton, and alſo except lime and lime-ſtone,) *one penny halfpenny* per ton per mile, and ſo in proportion for leſs than a ton or leſs than a mile.

For all lime and lime-ſtone, carried on this canal between the Birmingham and Worceſter canal and Salters-lane, or upon the cut to Tanworth, *one penny halfpenny* per ton per mile, and ſo in proportion.

For all lime and lime-ſtone carried between Salters-lane aforeſaid and Stratford, or upon the branch to Temple Grafton, *one penny halfpenny* per ton, and ſo in proportion for leſs than a ton.

For all flag-ſtones, and coal for the purpoſe of burning lime only, carried between Salters-lane and Copmaſs Hill, or on the cut to Temple Grafton *four pence* per ton, and ſo in proportion.

Stratford Canal.

For goods remaining on wharf more than twenty-four hours a reaſonable compenſation.

Exemption from Rates. Paving ſtones, gravel, ſand, &c. for making and repairing of roads; dung, ſoil, marl, or other manure, (lime and lime-ſtone excepted) for the improvement only of the grounds of any perſon whoſe lands ſhall be taken for the purpoſes of this canal; provided the ſame do not paſs any lock unleſs the water ſhall flow over the waſte weir.

No boat under ten tons to paſs any lock without leave.

Stop gates are to be erected on this canal, within five hundred yards of the Worceſter and Birmingham canal; which gates may be ſhut or locked up, if the water ſhall be lower in this, than in the other canal.

Goods or other things navigated on this canal, and northward on the Birmingham and Worceſter canal, are to pay no higher rates to the latter company, than ſhall be paid for the ſame, navigated on this canal between the junction and Salters-lane, notwithſtanding the act of 31 George III.

The Proprietors of the Worceſter and Birmingham Canal are to pay George Perrott, eſq. as a compenſation for his dues on the river Avon, which it is ſuppoſed this canal will diminiſh, the ſum of 400l. per annum; and till this canal is completely made navigable, the ſaid Worceſter and Birmingham Canal Company are to pay to G. Perrott, eſq. ſuch ſums of money as ſhall be ſufficient to make up the preſent annual rents of 1227l. payable for the lower navigation of the Avon by the preſent tenants, provided the ſame after the paſſing of this act cannot then be let for that ſum of money.

The line of this canal interſects a country abounding with lime-ſtone and minerals, which by the Birmingham canal have a ready conveyancy to that town, and the other extremity of the canal falling into the Avon at Stratford, has an immediate water communication with the Severn and its unlimited connections, to the great advantage of the proprietors of mines on the line of this canal. Stratford Canal.

STAINFORTH AND KEADBY CANAL. Stainforth and Keadby Canal.

Deſcription of a Canal from the River Dun, near Stainforth in the Weſt Riding of Yorkſhire, to the River Trent near Keadby in the County of Lincoln. 33 *Geo. III. Ch.* 117.

THIS canal commences at the river Dun, about a mile to the weſt of Fiſhlake, and runs parallel with the river oppoſite to Thorn; whence in a line nearly due eaſt, it paſſes Crowle and Keadby, where it joins the river Trent. There is a branch of about a mile acroſs Thorn Common to a place called Hangman Hill which joins the river Dun. The total length of this canal is between fourteen and fifteen miles, and running through a part of the fenny country has little elevation, and no lockage, except out of the rivers at the extremities.

The proprietors of this canal are incorporated under the name of "The Proprietors of the *Stainforth and Keadby* Canal Navigation," and have the cuſtomary powers for making the canal. The ground allowed for the canal towing-path, ſide drains, &c. is one hundred yards in breadth; a reſervoir of five

Stainforth and Keadby Canal.

five acres may be made on Thorn Common. The proprietors are allowed to raiſe 24,200l. to be divided into ſhares of 100l. each. No perſons to have more than fifteen ſhares, which are to be numbered and a ticket delivered for each, having the ſeal of the company, paying the clerk *two ſhillings and ſix-pence* for each ticket: if the above ſum is not ſufficient, may raiſe a further ſum of 12,100l.

The allowed *rates* are—

For every ton of fir timber, deals, aſh, elm, oak, per mile, *one-penny*.

For every ton of coals, ſleck, cinders, culm, charcoals, and lime, per mile, *three farthings*.

For every ton of lime-ſtone, per mile, *one-halfpenny*.

For every ton of other ſorts of ſtone, iron ſtone, flags, paving ſtone, ſlate, iron, pig iron, bar iron, old iron, caſt metal, bricks and tiles, per mile, *one-penny*.

For every quarter of wheat, ſkelling, beans, peas, vetches, lintels, rape, line, cole and muſtard ſeed, apples, pears, onions and potatoes, carried the whole length of the canal, and in the ſame proportion for a leſs diſtance, *four-pence*.

For every quarter of barley, carried as above, *three-pence*.

For every quarter of malt or oats, carried as above, *two-pence*.

For every ton of groceries, linen or woolen yarn, cotton, flax, hemp, wares, merchandize, &c. per mile, *one-penny farthing*.

For every boat which ſhall navigate only between Stainforth Lock and Hangman Hill, *ſix-pence* per ton.

Exemptions from Rates. All dung or other manure (except lime) produced in any of the pariſhes through which the canal paſſes

paſſes. Alſo all turves and peats dug from Thorne Peat Moors, or the Peat Moors of Crowle, and Keadby, which ſhall be navigated to the river Dun: but if the ſame be navigated to the river Trent, then ſhall pay *one-penny* per ton per mile. Stainforth and Keadby Canal.

Alſo in recompence, on ſuch articles as may want craneage and porterage, *ſix-pence*.

For *Wharfage* as follows, per ton.	More than twenty-four Hours to Six Days.	Six Days, to One Month.	One Month, to Six Weeks.	Six Weeks to Two Months	Two Months, to Ten Weeks.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
For all Goods, Wares, &c. -	0 0 6	0 0 9	0 1 0	0 1 3	0 1 6
For all *Engliſh* Timber, and Pig and Bar Iron - -	0 0 3	0 0 6	0 0 9	0 1 0	0 1 3
For all Coal, Stone, Iron Stone, Lime Stone, Flint, Clay, and Sand	0 0 0½	0 0 1	0 0 1½	0 0 2	0 0 2½
For all Lime, Bricks, Tiles, Plaiſter, and Soaper's Aſhes -	0 0 1	0 0 2	0 0 3	0 0 4	0 0 5
For every Quarter of Corn, Cole, Rape, Line and Muſtard Seed, Apples, Pears, Onions, and Potatoes	0 0 0½	0 0 1	0 0 1½	0 0 2	0 0 2½

And ſo in Proportion for any longer Time than Ten Weeks.

No

Stainforth and Keadby Canal.

No veſſel under twenty-five tons to paſs any lock without leave, or paying that tonnage.

All veſſels that turn out of the cut of the river Dun at Stainforth into this canal, are liable to pay to the Dun Company, the rates, tonnage, tolls, &c. which would have been due for paſſing the lock near the ſaid junction.

The waſte water of this canal is to be diſcharged into the Trent.

The uſes of this canal appear to be principally local, the coal of Yorkſhire will have an eaſy acceſs to the country, and the timber, corn, &c. on the line of the canal, will have a cheap carriage to diſtant markets.

Stowmarket and Ipſwich Navigation, to Amend.

STOWMARKET AND IPSWICH NAVIGATION, TO AMEND.

BY an Act this Seſſion, 33 Geo. III. Ch. 20. The proprietors of this navigation are authoriſed to raiſe for the purpoſes of the ſaid navigation, the ſum of 15,000l. in addition to the 14,300l. before allowed to be raiſed.

ULVERSTONE CANAL.

Ulverſtone Canal.

Particulars of an Act, 33 *Geo. III. Ch.* 105. *for making a Navigable Cut from Hammerſide Hill to the Weint End, near the Town of Ulverſtone, in the County of Lancaſter.*

THE length of this canal or cut is about one mile and a half, and is intended altogether for the conveniences of the trade of the town of Ulverſtone, by having an immediate communication with the Iriſh ſea, with proper baſins, wharfs, &c. neceſſary for the uſes of the ſhipping and merchandiſe. The canal is completed, with a lock of one hundred and twelve feet long.

The proprietors are incorporated under the name of "The Company of Proprietors of the *Ulverſtone Canal* Navigation," with the neceſſary powers for making the canal, which is appointed to be fifteen feet deep, thirty feet wide at the bottom, and ſixty-five feet wide at the top, with a ſufficient towing path, &c.

The company are authoriſed to raiſe 4000l. to be divided into ſhares of 50l. each; may borrow 3000l. more, if the firſt ſum is not ſufficient.

And are allowed to take the following rates for *tonnage and wharfage*:

For all merchants' goods, bar-iron, pig-iron, timber, coals, &c. *ſix-pence* per ton.

For all ſlate, lime, iron-ſtone, iron-ore, and all kinds of ores, *four-pence* per ton.

Ulverſtone Canal.

For every veſſel continuing in the baſin or dock, longer than four days, after the cargo is diſcharged *one penny* per ton per week, to be computed from the regiſter of the veſſel.

For goods remaining longer on *wharfs* than twenty-four hours, a reaſonable allowance to be made.

The proprietors are to build a public bridge over the canal at Hammerſide Hill. A junction may be formed between this and the Lancaſter canal. Coal, culm, or cinders, carried from the Lancaſter canal into the Ulverſtone canal, are not liable to the Sea duty.

Union Canal.

UNION CANAL.

Deſcription of a Canal from the Town of Leiceſter to the Town of Northampton, (there to communicate with the River Nen, and the Grand Junction Canal) with a Branch to Market Harborough. Surveyed by John Varley, ſen. and C. Staveley, jun. 33 *Geo III. Ch.* 98.

THIS canal commences at, and joins the river Soar navigation on the weſt ſide of Leiceſter, and for near three miles, that is to Ayleſton, runs with a few deviations in the courſe of that river; from Ayleſton the whole of the line is new cutting, and running a ſoutherly courſe paſſes Glen Parva, Wigſton, Newton Harcourt, Wiſtow, and Saddington, where is a tunnel of forty chains; from this tunnel making an elbow it paſſes Foxton, where is another tunnel of forty-eight chains, paſſing which is the branch to Market Harborough, from the above tunnel it makes a bend, croſſes the river Welland, and paſſes between

between Marſton Truſſel, and Hothorp, and turns up by Eaſt Farndon and Oxendon Magna, where is a ſmall tunnel of thirteen chains; near here alſo is the reſervoir for the ſummit level, ſupplyed by the Oxendon Brook. From Oxendon it goes near Kelmarſh, where it paſſes another tunnel of forty-five chains, and proceeds by Maidwell, Lamport, Hanging Houghton, Brixworth, and parallel with that branch of the river Nen, called the Northern river; it paſſes Spratton, Piſford, Chapel Brampton, Kingſthorp, Dallington, and on the weſt ſide of Northampton, joins the river Nen navigation, and the branch of the Grand Junction canal; completing a courſe of forty-three miles and three quarters, from Leiceſter to Northampton, with four hundred and ſeven feet and a half of lockage, and paſſing through four tunnels. The branch to Market Harborough, from the junction is three miles and three quarters, and is level. The lockage may be more particularly ſpecified as follows, from Weſt Bridge at Leiceſter, where it joins the Soar, to near Saddington is twelve miles and three quarters, with one hundred and ſixty feet riſe; from thence to near Oxendon Magna is thirteen miles and a half, and level; here, in one furlong is a riſe of fifty feet to the ſummit level, which continues to the ſouth ſide of the tunnel at Kilmarſh, near five miles; from thence to the junction with the Northern river at Northampton, is eleven miles and three quarters, with one hundred and ninety-ſeven feet and a half fall; from thence to the junction with the river Nen is three quarters of a mile, and level.

Union Canal.

The proprietors of this undertaking are incorporated under the name of "The Company of Proprietors of the Leiceſterſhire and Northamptonſhire *Union Canal*," with the neceſſary

Union Canal.

powers for making the canal, &c. No water for the uſe of this canal is to be taken from any ſprings, &c. on the eſtate of Lady Denbigh; nor from the Kelmarſh Brook to the prejudice of Mr. Hanbury's eſtate; nor from the ſprings, &c. on the eſtate of Thomas Pares, eſq. nor to diminiſh the average quantity of water in the Kelmarſh and Oxendon Brooks; nor to take more water from the mill at Ayleſton, than ſhall be ſufficient for the trade of that place; the water of the Cotton Mill at Northampton is alſo protected.

The land allowed for the breadth of the canal, towing-path, &c. is twenty yards, and not to deviate more than one hundred yards from the book of reference. The earth, &c. dug in making this canal, is to be properly ſpread and diſtributed on the adjoining grounds at the company's expence.

For the purpoſes of this canal the proprietors may raiſe the ſum of 200,000l. to be divided into ſhares of 100l. each, and if not ſufficient a further ſum of 100,000l. and for an indemnification, the company are allowed to take the following *rates of tonnage*, viz.

For all coal, and coak, navigated, &c. *two-pence halfpenny* per ton per mile, ſo that the groſs amount of the ſame ſhall not exceed *five ſhillings* per ton.

For all lime, lime-ſtone, dung and manure, *one-penny farthing* per ton per mile, ſo that the groſs amount of the ſame ſhall not exceed *two ſhillings and ſix-pence* per ton.

For all cattle, calves, ſheep, ſwine, &c. and all ſtones, bricks, tiles, ſlates, ſand, iron ſtone, pig iron, and pig lead, *two pence* per ton per mile.

For

For all other goods, wares, &c. *three-pence* per ton per mile. Union Canal.

Exemptions. Officers and ſoldiers upon their march, their horſes, arms, or baggage, timber or ſtores for his majeſty's naval or military ſervice, on producing a proper certificate for the ſame; alſo all gravel, ſand, &c. for making or repairing any public road; alſo dung, marle, ſoil, or other manure (lime and lime-ſtone excepted) for the purpoſe of manuring grounds, &c. belonging to any perſon through whoſe lands the canal goes; provided the ſame do not paſs any lock, unleſs the water ſhall flow over the waſte weir.

For goods, &c. remaining on *wharfs*, &c. more than twenty-four hours a reaſonable allowance ſhall be made.

The towing-path may be uſed as a bridle-way and drift-way for cattle, by owners of adjoining lands.

Boats under twenty tons lading are to pay that tonnage, unleſs the water is not ſufficient, or when two boats ſhall paſs one lock together.

The company guarrantee to Lord Harborough that the rents, &c. of the weighing engine, &c. at Market Harborough ſhall not be leſs than 120l. per annum.

They alſo guarrantee to the Living of Langton, the ſum of 600l. per annum, according to the Act of 31 Geo. III. for incloſing the pariſhes of Weſt Langton, Eaſt Langton, &c. A propoſed canal from Uppingham, in Rutlandſhire, is allowed to communicate with this canal.

The

Union Canal.

The line of connection this canal will complete is of great importance, by it, and the Grand Junction Canal, all the various produce navigated on the Derbyſhire and Yorkſhire canals, the Grand Trunk and the River Trent, will have a ready acceſs to the London market; beſides paſſing through a very populous country where land carriage cauſes many of the neceſſaries of life to be dear. The inhabitants of the populous towns of Leiceſter and Northampton are particularly intereſted in carrying this ſcheme into complete execution.

WARWICK AND BIRMINGHAM CANAL.

Warwick and Birmingham Canal.

Deſcription of a Canal from the Borough of Warwick to the Birmingham and Fazeley Canal at Birmingham, 33 *Geo. III. Ch.* 38.

THIS canal commences on the weſtern ſide of the town of Warwick and paſſes Budbrook, Hatton, Rowington, Badeſley Clinton, Knowle, Solihull, Yardley, and joins the Digbeth branch of the Birmingham and Fazeley Canal on the eaſtern ſide of Birmingham, being a courſe of about twenty-five miles.

The proprietors of this undertaking are incorporated by the name of "The Company of Proprietors of the *Warwick and Birmingham* Canal Navigation," with the neceſſary powers for completing the ſame. By mutual agreement, a junction may be made with the Birmingham and Fazeley Canal, on condition of making this canal on a level with that part of the Birmingham and Fazeley Canal where the junction ſhall be formed, and never drawing the water lower than four feet without

without conſent. Alſo all goods paſſing into or out of the Birmingham and Fazeley Canal ſhall pay to that company— Warwick and Birmingham Canal.

For the *tonnage and wharfage* of all coals, coke, iron, ironſtone, goods, wares, &c. which ſhall paſs out of the Birmingham and Fazeley Canal into this canal *ſix-pence* per ton.

And for the ſame paſſing into the Birmingham and Fazeley Canal *three-pence* per ton.

The above granted rate of *ſix-pence* per ton to be reduced to *five-pence* per ton, ſo ſoon as the ſum of 36001. with intereſt, ſhall have been paid by the Birmingham and Fazeley Canal Company, to certain perſons as ſpecified by their Act of Parliament, 23 Geo. III.

The ground allowed for the uſes of this canal, towing-path, &c. is thirty yards in breadth, and not to deviate more than one hundred yards from the line laid down in the book of reference. No water to be taken from the river Rea, nor from the ſprings which ſupply Olton Mill, to its injury.

The proprietors are authoriſed to raiſe the ſum of 100,0001. to be divided into ſhares of 1001. each. No perſon to have more than fifteen ſhares. A further ſum of 30,0001. may be raiſed if neceſſary.

The allowed rates for *tonnage and wharfage* are—

For all coal, ſtone, iron, timber, &c. carried on the canal for leſs than ſix miles, and paſſing any lock, *one-ſhilling* per ton, and ſo in proportion for a leſs quantity.

For all coal, ſtone, iron, timber, &c. carried ſix miles, and leſs than twelve miles, *two-pence* per ton a mile, and ſo in proportion.

For

Warwick and Birmingham Canal.

For all coal, ſtone, iron, timber, &c. carried twelve miles, and leſs than ſixteen miles, and not paſſing the uppermoſt lock at each end of the upper ſummit, *two-ſhillings* per ton.

For all coal, ſtone, iron, timber, &c. carried ſixteen miles and upwards, and not paſſing the uppermoſt lock at both ends of the upper ſummit, *one-penny halfpenny* per ton per mile.

For all coal, ſtone, iron, timber, &c. which ſhall paſs any or either of the locks at both ends of the upper ſummit, *two ſhillings and three-pence* per ton.

For all coal, ſtone, iron, timber, &c. carried from Birmingham towards Warwick, and which ſhall paſs the upper lock below Hatton Hill, *two ſhillings and nine-pence* per ton.

For all coal, ſtone, iron, timber, &c. carried leſs than a mile, and not paſſing any lock thereon, *two-pence* per ton.

For all coal, ſtone, iron, timber, &c. carried one mile, and leſs than ſix miles, and not paſſing any lock, *two-pence* per ton a mile: provided always, that no more than after the rate of two thirds of the above tolls or dues ſhall be demanded or taken for the tonnage of any lime or lime-ſtone which ſhall be navigated, carried, or conveyed upon or along the ſaid canal, or any part thereof.

Exemptions from rates. All paving-ſtone, gravel, ſand, &c. for making and repairing roads; all dung, ſoil, marle, or other manure (lime and lime-ſtone excepted,) for the improvement only of grounds belonging to perſons whoſe lands have been taken for the uſes of this canal, and provided ſuch things do not paſs any lock unleſs the water ſhall flow over the waſte weir.

For *wharfage* goods remaining more than twenty-four hours a reaſonable compenſation ſhall be made.

No boat leſs than twenty tons, nor leſs than ſeventy feet long, ſhall paſs any lock without leave. Warwick and Birmingham Canal.

Owners and occupiers of lands may uſe huſbandry boats free of rates, but not broader than five feet, nor to paſs any lock, nor carry for hire.

The activity of Birmingham is in nothing more conſpicuous than in projecting of canals, and ſurely the great number which ſurround that town is the beſt poſſible evidence of their great utility, if the old maxim ſtill remains in force, viz. "*experience teaches*," and habited as the monied men of Birmingham are, to calculations of profits.

The navigation of the Avon reaching no higher than Stratford, the town of Warwick has been without any water conveyance; that eſſential article coal will now be ſupplied from the Wedneſbury works at a cheap rate, and in any quantities: the line of county alſo through which the canal paſſes is not deficient in minerals, ſo that the benefits ariſing from this ſcheme, may be looked upon as giving pretty general ſatisfaction.

Aſhby de la Zouch Canal.

ASHBY DE LA ZOUCH CANAL.

Deſcription of a Canal from the Coventry Canal at Marſton-Bridge, in the County of Warwick, to Aſhby de la Zouch in the County of Leiceſter, with branches to Swadlincote, the Lime Works at Ticknall, Cloud Hill, &c. 34 *Geo. III. Ch.* 93.

THIS canal joins the Coventry Canal at Marſton Bridge, about two miles to the ſouth of Nuneaton, and taking an eaſterly courſe paſſes Hinckley, from whence it takes a north courſe and paſſes Stoke Golding, Dadlington, through Boſworth Field, and within a mile of Market Boſworth, after which it croſſes the river Sence, and paſſing to the eaſt of Gopſal Park, arrives at Snareſton, where is a ſmall tunnel, from whence the canal winds along and paſſes Meaſham, Okethorpe, and over Aſhby Woulds, whence paſſing through Blackfordby it reaches the north weſt ſide of Aſhby de la Zouch; the canal is then continued about one mile and a half beyond the town, where paſſing a tunnel of near one mile, a branch bends to the weſt and goes to Ticknall; another branch goes to the eaſt and finiſhes at the lime works at Cloud Hill; on the Ticknall branch near the commencement is a ſhort cut to the lime works at Staunton; there is alſo a branch on the north edge of Aſhby Woulds, which goes to the coal works at Swadlincote; the total length of this canal with the branches, is fifty miles, with two hundred and fifty-two feet lockage.

Aſhby de la Zouch Canal.

The firſt twenty-ſix miles and a half of this canal, that is from the junction to Oakthorpe Fire Engine, which is on the ſouth ſide of Aſhby Woulds, is level; from thence acroſs the Woulds is four miles one furlong, with one hundred and forty feet riſe; from thence to the Old Parks, that is paſt Aſhby de la Zouch, is four miles five furlongs, with eighty-four feet fall, in the laſt mile: the branch to Ticknall is four miles five furlongs, and level; the branch to Staunton lime works is ſeven furlongs, with twenty-eight feet fall; the branch to Cloud Hill is ſix miles ſix furlongs, and level; the branch to Swadlincote is two miles one furlong.

The level of this canal from Aſhby Would is continued along the Coventry Canal and to Hill Morton on the Oxford Canal, being an uninterrupted line of level canal navigation, of more than ſeventy miles.

The proprietors of this canal are incorporated by the name of "The Company of Proprietors of the *Aſhby de la Zouch* "*Canal*," with the neceſſary powers for making the ſame; allowing twenty-four yards breadth of ground for the canal, towing path, &c. and are not to deviate from the line drawn in the book of reference without leave.

The water to be preſerved undiminiſhed, and uncontaminated to Mr. Curzons at Gopſal Park, under the penalty of 50,000l. the water from many ſprings are forbidden to be taken. The cut to Stanton Harold is to be made, if the Earl of Ferrers deſires the ſame.

Aſhby de la Zouch Canal.

Wharfs for public uſe are to be made upon Aſhby Woulds, and at Green Hills paſture near Sutton Cheney. The branches to Ticknall and Cloud Hill are to be completed in five years from the date of the act. Rubbiſh, &c. to be properly levelled on the adjoining lands, at the expence of the company. Proprietors of ſteam engines are to lift the water into the canal. The towing path may be uſed as a horſe or drift way, by occupiers of lands. The ſides of the canal where neceſſary, are to be properly puddled. Melbourne Brook is to be deepened, ſo as to be able to carry off the flood waters, into the river Trent.

The company are authoriſed to raiſe the ſum of 150,000l. to be divided into ſhares of 100l. each; alſo a further ſum if neceſſary of 50,000l. Shares to be numbered, and a ticket for each given, on paying to the clerk *two ſhillings and ſix-pence.* No perſon to give more than ten votes.

The following *rates of tonnage* are allowed,—

For all coal, lime, and ſlate, *one penny farthing* per ton, per mile.

For iron-ſtone, building ſtone, grinding ſtone, lime ſtone, bricks and tiles; for all cattle, ſheep, ſwine, and other beaſts, *three farthings* per ton, per mile.

For cotton, wool, hops, corn, timber, bark, wrought iron, cheeſe, &c. *two-pence* per ton, per mile.

Exemption from tolls, dung, aſhes, marle, clay for manure; gravel, ſand, &c. for the purpoſe only of making or repairing any public or private road.

Fractions to be paid as for a half mile, and as for a ton.

Boats

Ashby de la Zouch Canal.

Boats under twenty tons are not to pass any lock without leave, or paying for that quantity; boats returning empty to be toll free; also any boat with less than twenty tons passing any lock when there is sufficient water for twenty tons lading, shall pay as a lock due for waste of water, *one shilling* at each lock; and also a tonnage rate of twenty tons; but if the water is not sufficient for twenty tons lading, no lock duty shall be paid, and the tonnage for such quantity only as the water will enable to carry. Boats only half the width of the locks are to pay for twenty tons, unless two shall pass together; then not less than ten tons each.

Compensation under certain conditions is to be made to Sir George Beaumont in respect of his collieries at Coleorton; and the company are impowered to purchase coals at the said collieries, for the purpose of indemnifying themselves from the said compensation.

As it is apprehended the making of this canal will be an injury to the Coventry Canal, it is agreed that there shall be paid to the Coventry Canal Company, over and above all other rates whatever, *five-pence* per ton for all coals, goods, merchandise, &c. carried out of, or into this canal, from the Coventry, Oxford, or Grand Junction Canals: and if at any future time a junction shall be made with this canal and the Oxford, or with the Grand Junction Canal, the aforesaid dues shall still be paid to the Coventry Canal, as if such goods, &c. had actually been carried on the Coventry Canal. The tolls for navigating on the Coventry Canal are to be calculated as from Griff, where the junction was originally intended, which is three furlongs more distant than Marston Bridge.

It

Aſhby de la Zouch Canal.

It is alſo enacted that this canal ſhall be upon a dead level from Aſhby Woulds, to the junction with the Coventry Canal.

Exemption from the toll of *five-pence* to the Coventry Canal; corn, or other grain; ſheep, or other cattle; iron-ſtone, or wrought iron got or made upon the banks of this canal; dung, aſhes, marle for manure, gravel, ſand and ſtones for roads.

Alſo as an indemnification to the Leiceſter navigation, for the great expences (30,000l.) they have been and ſtill are at for maintaining rail ways and water levels between the Soar Navigation, and the Coal Works in the ſeveral pariſhes of Swannington and Coleorton, and in Thringſtone Common; it is allowed to the Leiceſter Navigation Company to take for their own uſes, *two ſhillings and ſix-pence* per ton on all coal carried from any works now open or hereafter opened in the ſaid pariſhes, and which ſhall paſs a certain place in the Lordſhip of Blackfordby; which is about three miles to the weſt of Aſhby de la Zouch.

The extenſive collieries on the northern parts of this canal, cannot fail being greatly benefited, when this canal ſhall be completed.

Birmingham Canal Extenſion.

BIRMINGHAM CANAL, EXTENSION.

Particulars of an Act for extending and improving the Birmingham Canal Navigation. 34 *Geo. III. Ch.* 87.

THE act authoriſes the proprietors of the Birmingham and Fazeley Canal to extend a branch of the Birmingham Canal from Broadwater in the pariſh of Wedneſbury to the town of Walſal,

ſal, and alſo to make three branches from the ſame, viz. one from the canal at Broadwater, to the townſhip or liberty of Bradley in the pariſh of Wolverhampton, another branch from the canal to the townſhip of Bilſtone, and another branch from the canal to terminate near to David's Barn Farm; and alſo when they ſhall think proper, to make another navigable cut from the Birmingham and Fazeley Canal at Bloomfield in the pariſh of Tipton, to communicate with the ſame canal at a place called Deepfield, in the pariſh of Sedgley: This, principally tunneling, will ſhorten the line four miles, by avoiding the curve the canal makes here.

Birmingham Canal Extenſion.

This act changes and abridges the old name of this company from "The Company of Proprietors of the Birmingham "and Birmingham and Fazeley CanalNavigation," to "The "Company of Proprietors of *The Birmingham Canal* Naviga-"tion." The company have the cuſtomary powers for making the cuts, &c. including all the powers granted by former acts. Are not to deviate from the line laid down in the book of reference, nor to take water from Rye Croft, Black Brook, Cole Pool, Gorlſcott, Fiſtley, Brown Hills, Clayanger, Catſhill, Piddocks Well, Little Heath, Linley, Hayhead, and Longwood, or from any ſprings, &c. which have uſually ſupplyed the mills or works belonging to the Earl of Montrath, the late Lord Dudley, or J. C. Jervoiſe, Eſq. the branch from Broadwater to Walſall is to be completed within three years.

For the purpoſes of this act the company, now the Birmingham Canal Company, are authoriſed to borrow the ſum of 45,000l. on the credit of the tolls, &c. and in recompence may take the following *rates for tonnage*, viz.

For

Birmingham Canal Extenſion.

For all coal, coak, lime-ſtone, iron-ſtone, and other minerals, navigated on any part of the branch to Walſall, *three-pence* per ton.

For all other goods, wares, &c. navigated on the ſame, *three-halfpence* per ton.

For all coal, coak, lime-ſtone, iron-ſtone, lime, goods, wares, &c. navigated on the new cut of this canal from Bloomfield to Deepfield, the ſame rates of tonnage and wharfage according to the diſtance as is granted by the act of the 8 Geo. III.

As ſeveral perſons have incurred conſiderable expence in forwarding a ſimilar undertaking to the preſent, an arbitrator is appointed to aſcertain how much the ſame may be, and which ſhall then be paid by this company in full ſatisfaction for the ſame; and until the ſame ſhall be fully reimburſed to this company, together with all intereſt, &c. they are authoriſed to take the following additional *tolls*, viz.

For all coak, coal, lime-ſtone, iron-ſtone, lime, goods, wares, &c. navigated on any cut or branch authoriſed to be made by this preſent act, *one penny* per ton, and ſo in proportion: ſeparate accounts are to be kept of this additional toll.

The tolls of *one ſhilling and five-pence halfpenny*, and *three-halfpence* per ton, payable to this company by 25 Geo. III. for certain goods paſſing out of, or into the Dudley Canal are reduced to the ſum of *eleven-pence* per ton; this is excluſive of the cuſtomary rate of *one penny* per ton; this to take place as ſoon as the cut from Bloomfield to Deepfield ſhall be navigable, as thereby the line of the canal will be ſhortened four miles: But after the ſame ſhall be completed, this company

are

are entitled to receive for the tonnage and wharfage of all ſtone, timber, wares, &c. (except coal, coak, iron-ſtone, lime, and lime-ſtone) carried upon any part of this canal between the junction of the Dudley and this canal and Autherley, and which ſhall paſs through the tunnel on the Dudley Canal, the ſame rates as ſuch ſtone, &c. would be liable to pay to this company, if the ſame had been carried into or out of the Birmingham Canal by way of Autherley; which dues, &c. ſhall be accepted by this company in lieu and full ſatisfaction for the rates granted by 25 Geo. III. in reſpect of ſuch articles paſſing through the tunnel of the Dudley Canal. Birmingham Canal Extenſion.

A treaſurer is by this act ordered to be choſen to receive and account for the monies collected at Farmer's Bridge for the ſatisfaction of certain perſons, &c. 23 Geo. III.

This extenſion of the Birmingham canal, fully evinces the great advantages derived from canal carriage to the owners of coal or other mines, when connected with manufacturing towns and a line of populous county.

HUDDERSFIELD CANAL.

Huddersfield Canal.

Deſcription of a Canal from Sir J. Ramſden's Canal at Huddersfield in Yorkſhire, to Aſhton under Line in Lancaſhire, there to join the Aſhton and Oldham Canal. 34 *Geo. III. Ch.* 53.

THIS canal joins Sir John Ramſden's canal on the ſouth ſide of Huddersfield, and taking a weſterly courſe runs parallel with the river Colne, which it croſſes twice, paſſing

Huddersfield Canal.

Longwood, Slaighthwaite, and Marſden: from Marſden, under Pule Moſs and Brunn Top, there is a tunnel of near three miles and a half long, which brings the canal to Raſp Mill, on the Diggle Water, and within about two miles of Dubcroſs; paſſing which, it takes the rout of the river Tame, the windings of which it frequently interſects, and paſſes within one mile of Lydgate, by Moſsley, Stayley Bridge, and joins the Aſhton and Oldham Canal on the ſouth ſide of Aſhton, being a courſe of nineteen miles and five furlongs, with ſeven hundred and ſeventy feet lockage, viz. from the junction at Huddersfield to Marſden, which is ſeven miles and a quarter, with four hundred and thirty-ſix feet riſe; from thence, and through the tunnel is three miles ſeven furlongs, and level; from thence to the junction at Aſhton is eight miles three furlongs, with three hundred and thirty-four feet fall. The head level is ſupplied with water from the reſervoirs to the ſouth of Marſden; there are alſo reſervoirs at the weſt end of the tunnel.

The proprietors of this canal are incorporated by the name of "The *Huddersfield Canal* Company," with the powers neceſſary for making the ſame, allowing thirty yards of ground in breadth for the uſes of the canal, towing-path, &c. but not to deviate more than one hundred yards from the line laid down in the book of reference. The company are to make reſervoirs ſufficient to contain twenty thouſand locks full of water, allowing each lock to contain one hundred and eighty cubic yards; and if the ſame ſhall be found inſufficient for the ſupply of the canal, other reſervoirs are to be made under the directions of the commiſſioners. Flood water only is to be taken for the uſe of this canal, from any ſprings, &c. now

ſupplying

ſupplying any mill, &c. and water drawn down the feeders from the reſervoirs, is to paſs in the uſual channel of brooks, &c. that mills may be benefited: a lock not exceeding eight feet wide, to be erected at the junction of this canal with Sir John Ramſden's canal. No rates or dues whatſoever are to be taken by Sir John Ramſden for any goods, &c. carried out of, or from this canal, upon any part of Sir John Ramſden's canal, lying between this canal and the warehouſes of Sir John Ramſden, near Huddersfield; and that part of the canal may be put and kept in repair, &c. by this company. No boat to be navigated from this canal below the Red Doles Lock, on Sir John Ramſden's canal, without leave. If any diminution of profits ariſing from the warehouſing and wharfage of goods, &c. ſhall happen to Sir John Ramſden in conſequence of making this canal, the ſame is to be made good by this company; the average to be taken upon three years.

Huddersfield Canal.

The company are authoriſed to raiſe the ſum of 184,000l. to be divided into ſhares of 100l. each, to be numbered and a ticket given, on paying *two ſhillings* to the clerk for each: no perſon to have more than five votes. A further ſum of 90,000l. may be raiſed if neceſſary.

The allowed *rates of tonnage* are not to exceed—

For dung, manure, clay, and gravel, not paſſing any lock, *one half-penny* per ton per mile.

For the ſame paſſing any lock, *three-halfpence* per ton per mile.

For ſtone, lime, coal, and cannel, or any other mineral not paſſing any lock, *one penny* per ton per mile.

For the ſame paſſing any lock, *two-pence* per ton per mile.

Huddersfield Canal.

For timber, goods, wares, &c. *three-pence*, per ton per mile.

And for ſtone, lime, coals, cannel, minerals, timber, goods, wares, &c. which ſhall paſs through the tunnel or any part thereof, in addition to the before mentioned rates, the further ſum of *one ſhilling and ſix-pence* per ton.

Fractions to be taken as for a mile and as for a quarter of a ton.

For *wharfage* not exceeding ten days, *three-pence* per ton, exceeding ten days, *one halfpenny* per ton per day.

No boat under fifteen tons when the water does not, or under ten tons when the water does, flow over the weir or any lock, to paſs without leave, or paying for that tonnage. And in caſe it may hereafter happen that a navigation ſhall be made eaſtwardly, to communicate with this canal, or the canal of Sir John Ramſden, which would be very injurious to the Air and Calder navigation, the Calder and Hebble navigation, and Sir John Ramſden's canal, as a full compenſation to theſe, the proprietors of this canal ſhall not be entitled to receive to their own uſes any tolls, or toll, on account of any goods, &c. navigated on the ſame, and from thence on this canal, or the contrary; but all ſuch tolls ſhall be paid and payable to the proprietors of the navigations of the Air and Calder, and the Calder and Hebble, and Sir John Ramſden's canal, in proportion to the length of the ſaid laſt mentioned navigations reſpectively, and the tonnage thereupon reſpectively collected.

This canal, beſides paſſing a country infinitely abounding with ſtone, coal, and other minerals, will unite the eaſt and weſt ſeas by an inland navigation; and as there remains not

twenty

twenty miles to be cut, to accompliſh this deſirable communication, it may be preſumed the ſame will be ere long completely effected, to the advantage of the proprietors, and to the benefit of the public. Huddersfield Canal.

HASLINGDEN CANAL.

Deſcription of a Canal from Bury Bridge, at Bury, in Lancaſter, to Church, in the ſame County, there to join the Leeds and Liverpool Canal. 33 *Geo. III. Ch.* 77. Haſlingden Canal.

THIS canal joins the Bury and Bolton Canal from Mancheſter on the weſt ſide of Bury, and taking a north courſe, paſſes Walmſley, Tottington, Haſlingden, Accrington, and joins the Leeds and Liverpool Canal at Church; being a courſe of about thirteen miles.

The proprietors are incorporated under the name of "The Company of Proprietors of the *Haſlingden Canal*," and have the cuſtomary powers for making the ſame, allowing twenty-ſix yards of ground in breadth for the uſe of the canal, towing-path, &c. and not to deviate from the line laid down in the book of reference, without conſent of owners of land. The company are alſo forbid to make any locks or other ſuch like works, for the paſſing of any boats, &c. but the ſame ſhall be done by rollers, racks, inclined planes, or other ſuch machinery, as a ſubſtitute for locks: but if at any time hereafter it ſhall be found expedient to make uſe of locks on this canal, it ſhall be lawful for the company to make the ſame, on obtaining the conſent of three-fourths of the mill

Haſlingden Canal.

owners on certain ſtreams. The mills on certain ſtreams are protected; and flood water only is to be taken for the uſe of the canal.

The company are impowered to raiſe the ſum of 47,600l. to be divided into ſhares of 100l. each, and a further ſum of 40,000l. may be raiſed if neceſſary.

The following *rates of tonnage* may be taken, viz.

For lime, lime-ſtone, clay, bricks, ſtones, coal or other mineral, *two-pence* per ton per mile.

For timber, goods, wares, &c. *three-pence* per ton per mile.

For coal, clay, bricks, ſtone, or any goods, wares, &c. which ſhall not paſs any locks, or paſs from one of the levels to another, *three halfpence* per ton per mile.

Fractions to be taken as for a mile and as for a quarter of a ton.

Exemptions from Rates. Small rubbiſh or waſte ſtones from delves and quarries, all paving and other ſtones, gravel, ſand, timber or wood, to be employed in making or repairing water banks, ſluices, or trenches upon this canal; or of any public or private roads, not being turnpike roads, in any townſhip, &c. through which the canal ſhall go; alſo all dung, ſoil, marle, aſhes of coal and turf, and other manure (except lime) for the uſe only of the lands in any townſhip, and through which the canal ſhall paſs; ſo that the ſame do not paſs from one level to another by means of any rollers, racks, inclined planes, &c. or if locks ſhall be uſed, unleſs the water ſhall flow over the waſte weir.

For

For *wharfage*, goods remaining above the ſpace of three weeks, a reaſonable allowance ſhall be made. Paſſage boats not to be navigated but upon terms mutually to be agreed upon. Haſlingden Canal.

The inexhauſtible ſtore of coal, lime, lime-ſtone, &c. contained in the bowels of the earth in the vicinity of this, and the preſent line of the Leeds and Liverpool Canals, in conjunction with the populous and manufacturing towns of Bolton, Bury, Mancheſter, and Liverpool, afford a good proſpect of profit to the proprietors; by it the goods from the eaſtern ſea, the manufactures of Leeds, &c. will have a cheap water carriage to the great towns on the eaſt ſide of the country, and in particular to the port of Liverpool.

KENNET AND AVON CANAL.

Kennet and Avon Canal.

Deſcription of a Canal from Newbury in the County of Berks, to the River Avon at Bath, in the County of Somerſet, with Branches to Calne and Chippenham, in the Counties of Wilts. John Rennie, Engineer. 34 *Geo. III. Ch.* 90.

THIS canal joins the river Kennet juſt above Newbury, runs parallel with that river through Lord Craven's park, and on to Kintbury, where it twice croſſes the Kennet and proceeding by Dunn Mill, croſſes the town of Hungerford, one mile above which, it again croſſes the Kennet, on the northern ſide of which it paſſes Froxfield, where it again croſſes the river to the ſouthern ſide; and a little below Great Bedwin again croſſes to the northern ſide, and proceeds to Crofton; where

Kennet and Avon Canal.

where are the head ſprings of the Kennet; from Crofton by means of a tunnel two miles three furlongs in length, it paſſes the high grounds about Burbage, and again meets the day at the little village of Brimſtade, whence it purſues its weſterly courſe by Wooton Rivers, Wilcot, Stanton Barnards, Allington, between South Horton, and Biſhops Cannings, to the principal town of Devizes, on the northern ſide of which it paſſes, and goes between the villages of Lower and Upper Foxhanger, by Bulkington, the village of Paxcroft, and the ſouthern ſide of Trowbridge, where it croſſes the Avon at Trowle Bridge, whence winding by Ladydown Farm, it paſſes Windbrook and Bradford, below which at Ancliff Mills, it croſſes the Avon, and proceeds on the northern ſide paſt Winſley, to Limpley Stoke, where it croſſes to the weſtern ſide of the Avon, and purſues its courſe uninterrupted by the ſide of that river paſt Bathampton, where the complete junction with the river Avon is formed.

It is propoſed under regulations hereafter mentioned, to make a collateral cut to the towns of Calne and Chippenham, which is to commence between Lower and Upper Foxhanger, about two miles to the weſt of Devizes, which, taking a northerly courſe, paſſes at a ſmall diſtance Bromham, and proceeds on the weſtern ſide of Sandridge Houſe, between Bewley Common and Laycock, to Great Lodge, whence one branch goes to Chippenham, and another to Calne.

The total length of this canal from Newbury to Bath, is ſixty miles, having one hundred and ſeventy-ſix feet riſe, and three hundred and ſixty-nine feet fall, which more particularly is as follows: From the Kennet navigation to Hungerford

gerford is nine miles, with ſeventy-two feet riſe; from Hungerford to Crofton is ſix miles, with one hundred and four feet riſe; the ſummit level from Crofton to Devizes, is twenty miles; from Devizes to near Bulkington, is three miles and a quarter, with two hundred and ſeventy-one feet fall; from Bulkington to near Paxcroft, is five miles, and level; from Paxcroft to Trowle Bridge, at Trowbridge, is three miles, with thirty-five feet and a half fall; from Trowbridge to near Bathampton, is ten miles and a half, and level; from thence to the river, is three quarters of a mile, with fifty-ſix feet and a half fall; from thence to the old Bridge in the town of Bath, is two miles and a quarter, with ſix feet fall; the branch to Calne and Chippenham is fourteen miles five furlongs in length; viz. from the junction with the canal at Foxhanger to Chippenham, is ten miles and a half, and level; from Great Lodge to Calne, is four miles one furlong, with eighteen feet riſe in the laſt half mile. Kennet and Avon Canal.

The waſte water from the head level is to be carried off, one moiety down the Bedwin Vale, at Crofton; the other moiety down the water-courſe at Horton, to flow down the river Bourn to Saliſbury. The company are to ſpread the gravel, rubbiſh, &c. on the adjoining ground, in a proper manner. The banks of the canal in the pariſh of Bathwick are to be raiſed, and the ſides puddeled, to prevent damage by floods, &c. the canal alſo is to be puddeled in other places, where neceſſary.

The act of parliament for this moſt important inland navigation was obtained in 1794, and incorporates the ſubſcribers by the title of "The Company of Proprietors of *the Kennet*

Kennet and Avon Canal.

"*and Avon Canal* Navigation." The company are impowered to purchaſe lands, &c. to enter, take poſſeſſion, dig, cut, &c. in the cuſtomary manner. There are many reſtrictions reſpecting water and land, the property of the ſeveral parties mentioned. A reſervoir of water is to be made at Devizes for the uſe of the town's people. Inclined planes are allowed and protected. No reſervoir, or ſteam, or other engine, to be made below Great Bedwin, for the purpoſe of ſupplying the canal with water. The land, under all ordinary circumſtances allowed for the canal, towing path, ditches, &c. is not to exceed thirty yards broad. The company are empowered to raiſe the ſum of 420,000l. for the purpoſes of this canal, which is to be divided into three thouſand five hundred ſhares, that is 120l. each ſhare: a ſufficient number of ſhares are to be ſubdivided into half ſhares, to be diſtinguiſhed by the letters A. and B. reſpectively; poſſeſſors of two half ſhares to have one vote. Shares to be numbered; a ticket may be had on paying to the clerk *ſix-pence*, which ſhall be evidence in courts of law, of poſſeſſion, &c. if the ſum before mentioned is not ſufficient, the company may raiſe 150,000l. more, by mortgage or new ſhares.

The *tolls* allowed to be taken are—

For hay, ſtraw, dung, peat, and peat aſhes, and for all other aſhes to be uſed for manure; chalk, clay, marle, and ſand, lime intended for manure, and all other articles for manure, and all materials for the repair of roads, *one penny* per ton per mile.

For coals, culm, coke, cinders, charcoal, iron-ſtone, pig iron, iron ore, copper ore, lead ore, lime, (except for manure) lime-ſtone, and other ſtone, bricks and tiles, *three halfpence* per ton per mile.

For

Kennet and Avon Canal.

For corn and other grain, flour, malt, meal, timber, bar iron, and lead, (except corn and other grain, flour, malt, meal, carried weſtward on ſuch part of the canal as ſhall be ſituate between the town of Devizes and the city of Bath) *two-pence* per ton per mile.

For corn and other grain, flour, malt, and meal, which ſhall be carried from the town of Devizes to the city of Bath, *three-ſhillings* per ton.

For corn, grain, flour, malt, and meal, carried weſtward on the canal between the town of Devizes and the city of Bath, and which ſhall not paſs the whole diſtance *three half-pence* per ton per mile.

For all other goods, wares, merchandiſe, &c. not particularly ſpecified, *two-pence halfpenny* per ton per mile.

Fractions are to be paid as for a half mile, and as for a quarter of a ton.

Veſſels laden with hay, ſtraw, corn in the ſtraw, materials for roads, manure, (except aſhes,) are not to paſs locks, unleſs the water ſhall flow over the waſte weir. Boats of leſs than twenty tons not to paſs locks without leave, or paying for twenty tons, unleſs two ſhall paſs together of ten tons each.

For *wharfage* exceeding forty-eight hours, a reaſonable allowance ſhall be made.

Owners, &c. may uſe pleaſure and huſbandry boats of not more than twelve feet long, and five feet broad; the ſame not to paſs any lock, nor carry for hire.

Arbitrators are appointed for making compenſation to the town of Marlborough for any loſs which may be ſuſtained by the inhabitants in their trade, market, &c. with the mode and extent of ſuch compenſation.

Kennet and Avon Canal.

The affairs and buſineſs of this company are put under the management of a committee of twenty-four proprietors, called "*The Committee of Management*," choſen as follows: Ten for the weſtern diſtrict, which includes the proprietors reſident in Briſtol, Bath, the counties of Somerſet and Glouceſter. Seven for the Wiltſhire diſtrict, which includes the proprietors reſident in the county of Wiltſhire. Seven for the eaſtern diſtrict, which includes the proprietors reſident in Berkſhire and elſewhere, except as above. Theſe to be elected by each diſtrict annually on the firſt Tueſday in July, at the ſeveral towns of Briſtol, Marlborough, and Hungerford; five ſhares to be a qualification. General meetings are to be held four times in every year at the town of Marlborough, or elſewhere, as ſhall be appointed, and ten days notice given by advertiſements. The committee of management may elect ſub-committees of not leſs than three proprietors from their own number for certain purpoſes. No perſon to give more than fifty votes, at a meeting to elect treaſurer and committee; and at other meetings not more than ten votes.

The powers of this company to make the branches to Calne and Chippenham, are ſuſpended for two years and a half; to give time for maturing a ſcheme for a canal, which is intended to iſſue from this line near Trowbridge, to paſs Chippenham, Wootton Baſſet, and Shrivenham, and join the Thames near Abingdon, or Wallingford; with branches to within one hundred yards of Calne and Chippenham, and provided the ſame be completed within ſeven years.

The canal is to be completed in twelve years, under certain conditions, of not navigating, within twenty miles of Newbury.

It

Kennet and Avon Canal.

It is in contemplation to extend this canal more weſterly into the county of Somerſet, to be called the Somerſet Coal Canal, which ſee.

The line of this canal has been ſo particularly deſcribed, and in which ſo many principal towns are connected with its courſe, that little need be ſaid reſpecting the great utility of the undertaking. The great and mercantile city of Briſtol muſt be very materially benefited, as this line will afford the neareſt poſſible route between that city and the metropolis, whereby the ports of the two great trading cities of England, are abſolutely united, by a ſafe, certain, and cheap conveyance of a few days only; totally avoiding the hazardous and tedious voyage by ſea, the diſadvantages of which muſt, in war time, be conſiderably augmented by increaſe of inſurance and delay of convoys. Beſides theſe great and manifeſt advantages the benefits experienced by ſo large a tract of manufacturing county muſt be very conſiderable; and the ſtaple commodity of England, viz. her woollen cloths and ſtuffs, muſt, by thus finding an eaſy conveyance to certain export markets, be materially and laſtingly benefitted: for if Engliſh manufactures can be got to the ports at a cheap expence, the great capitals and ſpirit of commerce poſſeſſed by the merchants, will in moſt caſes find a foreign market for their conſumption. Upon the whole therefore, it is fair to conclude, the line of this canal is likely to benefit the county equally at leaſt, with any which has yet been projected.

Leeds and Liverpool Canal, to Vary.

LEEDS AND LIVERPOOL CANAL, TO VARY.

Particulars of an Act of Parliament to enable the Proprietors of the Leeds and Liverpool Canal to complete the ſame, and to vary the Line thereof, and for making a Branch to Ighton Hill Park. 34 *Geo III. Ch.* 94.

THE variation allowed by this Act was ſpoken of in the ſecond edition of our work, in the account of the Leeds and Liverpool Canal, page 254; what was there anticipated as probable, is now confirmed by law, and will enable the proprietors to purſue with vigour a ſcheme which has been long in agitation; in which an immenſe ſum of money is embarked, and which certainly is fraught with many ſubſtantial benefits to the trade and commerce of the northern counties. Much oppoſition has been made to this deviation as too much interfering with ſimilar concerns: theſe objections however have at laſt been obviated or over-ruled, ſo that the line moſt to be deſired, as well by the proprietors as by the public, will now be purſued with alacrity and attention; whereby a ſcheme of no common bulk and extent, will be happily completed.

The courſe and lockage before referred to being according to the preſent intent, we paſs on to notice the particulars of the preſent Act.

The canal is not to deviate from the line laid down in the book of reference without conſent of the land owners. The water of ſundry brooks, &c. are forbidden to be taken for the uſe of the canal. Side cuts may be made by the Rev. Mr.

Walton,

Walton, the Earl of Balcarras, and Mr. Shuttleworth; the ſame to be upon a level with the canal, and each to be provided with proper ſtop-gates, to prevent loſs of water to the canal: a cut is alſo to be made by the company to the valuable bed of coal at Ighton Hill Park, which is between Wigan and Chorley. The land allowed for the canal, towing-path, &c. is twenty-ſix yards in breadth. The Act contains all the modern regulations for eſtimating the value of lands, ſettling matters in diſpute, &c.

Leeds and Liverpool Canal, to Vary.

The company are authoriſed to take the following *rates*, viz.

For clay, brick, or ſtones, *one halfpenny* per ton per mile.

For coal or lime, *one penny* per ton per mile.

For timber, goods, wares, &c. *three halfpence* per ton per mile.

For ſoap-aſhes, ſalt, ſalt ſerow, foul ſalt, and grey ſalt, pigeons' dung, rape or cole ſeed or duſt, rags, or tanners' bark, to be uſed in manuring the lands of any perſon whoſe lands ſhall be cut through by the canal, ſuch lands lying in any townſhip through which the canal paſſes, no more than *one farthing* per ton per mile ſhall be paid.

Exemption from rates, ſmall rubbiſh, or waſte ſtones from delves and quarries, all gravel, and ſand for making and repairing the roads, not being turnpike, in any townſhip, &c. through which the canal paſſes, and which ſhall not be carried more than five miles on the canal; alſo all dung, ſoil, marle, aſhes of coal, and turf, for the improvement of lands in any townſhip, &c. or belonging to any perſon whoſe lands the canal paſſes through.

Fractions

Leeds and Liverpool Canal, to Vary.

Fractions to be taken as for a mile, and as for a quarter of a ton.

Alſo for every boat which ſhall paſs the lock next the junction of this canal with the river Air, not having been navigated eight miles on the canal, the like tonnage as if ſuch boat had been navigated eight miles thereon.

Goods of any kind paſſing from the Leeds and Liverpool canal upon the Douglas navigation, ſhall pay no greater rates for tonnage and wharfage, than is allowed to the Leeds and Liverpool company.

But coal carried on the Douglas navigation, and from thence upon any other navigation (ſave the Leeds and Liverpool) which ſhall communicate therewith, or with the Leeds and Liverpool Canal, ſhall pay the full rates granted by the 6th Geo. I.

No boat is to paſs through the firſt lock on either ſide of the ſummit level, but at ſuch times as the water ſhall flow over the waſte weir of ſuch lock reſpectively.

The company are authoriſed to borrow for the purpoſes of this act the ſum of 280,000l. on ſecurity of the tolls, &c. but no more money is to be borrowed by virtue of the act of 30 Geo. III.

The rights of the corporation of Liverpool to certain tolls are to remain and continue.

This variation of the line of this canal will be of conſiderable advantage to the company, and to many towns of great trade on the line, which will be materially accommodated by an immediate water carriage for their manufactures to Liverpool and Hull; and will alſo give them a regular ſupply of articles from thoſe towns, and the very extenſive line of intermediate

mediate county, and with other canals, now to be connected with this; the ſlate, ſtone, flags, &c. of the eaſt end of this canal, will have a ready market at the weſt end of the ſame; and the coal, cannel, &c. of the weſt end, will be as acceptable at the eaſt end. To the company, it will be a conſiderable hope of reimburſement for their great capital, (above 800,000l.) by the trade of the intermediate county; now the original plan and intent of this canal, is in a great meaſure done away, by rival ſchemes for uniting the eaſt and weſt ſeas.

MERSEY AND IRWELL NAVIGATION, TO INCORPORATE.

Merſey and Irwell Navigation, to Incorporate.

Particulars of an Act of Parliament for altering an Act of 7 Geo. I. for making the Rivers Merſey and Irwell navigable from Liverpool to Mancheſter, in the County of Lancaſter, &c. 34 *Geo. III. Ch.* 37.

THIS act recapitulates the intent of the former act, for enabling certain perſons to make navigable the rivers Merſey and Irwell for boats, &c. from Liverpool to Hunt's Bank in Mancheſter, and allowing certain rates of tonnage on the ſame; and by reaſon of the great increaſe of trade and manufactures in the county of Lancaſter, the navigation upon the ſaid rivers has become very conſiderable, &c. The proprietors are deſirous to be incorporated into a body politic and corporate, &c. the preſent proprietors are named, and it is enacted, that they be one body politic and corporate, by the name of "The Company of Proprietors of the *Merſey* "*and Irwell Navigation*," with all cuſtomary powers, veſtments, &c.

Leeds and Liverpool Canal, to Vary.

Fractions to be taken as for a mile, and as for a quarter of a ton.

Alſo for every boat which ſhall paſs the lock next the junction of this canal with the river Air, not having been navigated eight miles on the canal, the like tonnage as if ſuch boat had been navigated eight miles thereon.

Goods of any kind paſſing from the Leeds and Liverpool canal upon the Douglas navigation, ſhall pay no greater rates for tonnage and wharfage, than is allowed to the Leeds and Liverpool company.

But coal carried on the Douglas navigation, and from thence upon any other navigation (ſave the Leeds and Liverpool) which ſhall communicate therewith, or with the Leeds and Liverpool Canal, ſhall pay the full rates granted by the 6th Geo. I.

No boat is to paſs through the firſt lock on either ſide of the ſummit level, but at ſuch times as the water ſhall flow over the waſte weir of ſuch lock reſpectively.

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Montgomery Canal.

MONTGOMERY CANAL.

Particulars of a Canal from Portywain Lime Works, near Llanyblodwell, in the County of Salop, to Newtown in the County of Montgomery. J. Dadford, jun. Engineer. 34 *Geo. III. Ch.* 39.

THIS canal commences at the Limeworks of Portywain, in the pariſh of Llanyblodwell (where it joins a branch of the Elleſmere Canal), from whence it paſſes near the village of Llanymynach, and croſſes the river Verniew, near which it joins another branch of the Elleſmere Canal; it then continues its courſe by Gwern-felû, (where a branch goes to the village of Guilsfield) to Welch Pool; the canal then runs parallel with the River Severn, paſt Berriew, through Garthmill, to the River Severn on the eaſt ſide of Newtown. The length of this canal is twenty-ſeven miles, excluſive of the branches, with two hundred and twenty-five feet lockage: the branch to Guilsfield is three miles and a quarter, and level.

By the junctions of this canal with the Elleſmere a direct communication is formed with Cheſter, and with Shrewſbury; and as it is in contemplation to form a canal from Newtown, by Ludlow, to join the Leominſter Canal, a communication will be opened to all the benefits of the ſouthern parts of the Severn.

The proprietors of this canal are incorporated by the name of "The Company of Proprietors of the *Montgomeryſhire* "*Canal*;" with the powers neceſſary for making the ſame, and conſtructing the ſeveral works. The ground allowed for the canal, towing path, &c. is twenty-four yards in breadth, and not to deviate more than one hundred yards from the line laid down in the book of reference. No water to be taken from Lledan Brook, Countrey Houſe Brook, or Llivior Brook, except ſo much as ſhall be neceſſary for the purpoſe of puddling

the canal; and for the uſes of the canal, the water for twenty-four hours from Lledan brook, viz. between Saturday night and Sunday night: certain mills alſo are to be purchaſed by the company, if injured by making the canal. Montgomery Canal.

For the purpoſes of this canal the company are authoriſed to raiſe the ſum of 72,000l. to be divided into ſhares of 100l. each, a further ſum of 20,000l. may be raiſed, if neceſſary.

The following *rates of tonnage and wharfage* are allowed to be taken for navigating the canal or cuts, (except between Llivior Brook on the weſtern ſide of the townſhip of Garth-mill and Newtown,) viz.

For all lime-ſtone, *one halfpenny* per ton per mile, and ſo in proportion for any leſs quantity.

For all coal, culm, and lime, *two-pence farthing* per ton per mile.

For all other ſtone, pig-iron, bricks, timber, tiles, ſlates, gravel, ſand, lead ore, iron ore, and all other raw materials, *three-pence* per ton per mile.

For all bark, cordwood, coak, charcoal, lead, wrought iron, baulk, and deals *three-pence halfpenny* per ton per mile.

For all other goods, wares, &c. *four-pence* per ton per mile.

The following *rates for tonnage and wharfage* for navigating on the canal between Llivior Brook and Newtown, viz.

For all lime-ſtone, *two-pence farthing* per ton per mile.

For all coal, culm, and lime, *three-pence* per ton per mile.

For all ſtone, pig iron, bricks, timber, tiles, ſlates, gravel,

Montgomery Canal.

ſand, lead ore, iron ore, and all other raw materials, *five-pence* per ton per mile.

For all bark, cordwood, coak, charcoal, lead, wrought iron, baulk and deals, *five-pence halfpenny* per ton per mile.

For all other goods, wares, &c. *ſix-pence* per ton per mile.

Fractions of a mile to be taken by the quarter; but not to be charged unleſs it exceeds one quarter, &c.

Exemptions, dung, ſoil, marle, aſhes, or other manure, (except lime, and lime-ſtone) to be uſed for the improvement only of adjoining lands; alſo ſtone, gravel, ſand, or other materials, for the repair or making of any public roads, in any pariſh through which the canal, &c. ſhall paſs.

When the profits of this canal ſhall amount to ten per cent. a reduction is to be made of *one farthing* per ton per mile on lime-ſtone, coal, and lime; alſo a ſecond reduction of *one farthing* is to be made on the ſame principles: but if the profits do not amount to eight per cent. the rates may be raiſed.

The company are made anſwerable for the intereſt due on certain turnpike truſts, if the tolls ſhall not produce ſufficient, by reaſon of making this canal.

The northern extremity, and in general the neighbourhood of this canal abound in quarries of lime-ſtone, free-ſtone, and ſlate, and with mines of coal, lead ore, and other minerals; and that they may become advantageous and productive to the ſeveral owners, water carriage muſt be obtained; this the canal will ſupply, producing general benefits.

RIVER

RIVER NEN NAVIGATION, TO AMEND.

River Nen Navigation, to Amend.

AN act was this ſeſſion, (viz. 34 Geo. III. Ch. 85,) obtained for improving the navigation of the river Nen between Peterborough and Thrapſton, called the Eaſtern Diviſion of the Navigation.

The act authoriſes the proviſions of this and a former act, to be executed by nine commiſſioners, who are to elect an overſeer or overſeers, to be called the commiſſioner overſeer, and to be entirely under their direction and cogniſance, for inſpecting the general concerns of the navigation, and putting in force their orders. Many other clauſes reſpecting the management of the entire concern, are enforced and explained.

OXFORD CANAL, TO AMEND.

Oxford Canal, to Amend.

AN act of parliament has been this ſeſſion, (viz. 34 Geo. III. Ch. 103.) obtained to remedy certain clauſes in former acts, which were inimical to the general proſperity of the company, and granting certain powers which before were wanting to their well being.

The act enlarges the qualifications of commiſſioners, and enables the company to fix the price of carriage for ſmall parcels under five hundred weight, a printed liſt of ſuch fixed prices, is to be ſtuck up at every public wharf. Coals, goods, &c. may be diſtrained for dues not paid.

The

Oxford Canal, to Amend.

The clauſe in 26 Geo. III. reſtraining any greater dividends than four per cent. until certain part of the money borrowed ſhall be paid off: or than five per cent. until all the money borrowed ſhall be paid off, is repealed; provided that no dividend be made until the intereſt due on all the money borrowed, up to the next preceding half year, has been fully paid and diſcharged: together with other clauſes of local import only.

Peak Foreſt Canal.

PEAK FOREST CANAL.

An Account of a Canal from Aſhton-under-Lyne, in the County of Cheſter, to Chapel Milton, in the County of Derby; with a rail way to Load's Knowl, within Peak Foreſt. 34 *Geo. III. Ch.* 26.

THIS canal joins the Aſhton and Oldham Canal on the ſouth ſide of the town of Aſhton, and croſſing the river Tame, paſſes Denton, Chad Kirk, Maple Chapel, Diſley, and arrives at Whaley Bridge, from whence a rail road goes by Chapel in le Frith, to Load's Knowl, in the Peak Foreſt; the canal from Chad Kirk runs parallel with, and on the weſtern ſide of the river Goyt. The length of this canal is about fifteen miles, and the rail way about ſix miles.

The proprietors are incorporated under the name of "The "Company of Proprietors of the *Peak Foreſt Canal*;" with the cuſtomary powers for making the canal and rail way; allowing twenty-four yards of ground in breadth for the canal, &c. and not to deviate more than one hundred yards from the

the line laid down in the book of reference. Surplus, or flood water only, to be taken from the rivers, &c. near the canal; water from mines, &c. may be taken for the uſes of the canal. Peak Foreſt Canal.

The company are authoriſed to raiſe the ſum of 90,000l. to be divided into ſhares of 100l. each; which are to be numbered, and a ticket for each given, on paying the clerk *two ſhillings*. No perſon to have more than five votes; a further ſum of 60,000l. may be raiſed, if the former ſum is not ſufficient.

The *rates of tonnage* are not to exceed,—

For lime-ſtone, *three-halfpence* per ton per mile.

For ſtone, lime, coal, and other minerals, *two-pence* per ton per mile.

For dung, clay, ſand, and gravel, not paſſing through any lock, *one penny* per ton per mile.

For the ſame paſſing through a lock, *two-pence* per ton per mile.

For timber, goods, wares, &c. *three-pence* per ton per mile.

Fractions to be taken as for a mile, and as for a quarter of a ton.

For *wharfage*, not exceeding ten days, *three-pence* per ton; and exceeding ten days, *one halfpenny* per ton per day.

Boats under fifteen tons when the water does not, or under ten tons when the water does, flow over the waſte weir, are not to paſs without conſent, or paying for that tonnage.

The

Peak Foreſt Canal.

The lime works within the Peak Foreſt, and the various lime and coal works in the vicinity of this canal, will be materially benefited by this water communication, with the manufacturing and populous towns of Mancheſter, Aſhton, Stockport, &c.

Rochdale Canal.

ROCHDALE CANAL.

Deſcription of a Canal from Halifax in Yorkſhire, to Mancheſter in Lancaſhire, commonly called the Rochdale Canal. John Rennie, Engineer. 34 *Geo. III. Ch.* 78.

THIS canal joins the river Calder navigation at Sowerby Bridge Wharf, juſt without the town of Halifax, and purſues a weſterly courſe along ſide the river to Hebden Bridge, and thence to Todmarden; after which, its courſe is to the ſouth, and paſſes a tunnel near one mile and three quarters long, after which it paſſes Littleborough, Rochdale on the ſouth ſide, Middleton, Failſworth, and through the town of Mancheſter to the Caſtle Field, where it joins the Duke of Bridgwater's canal; there is a ſhort branch of leſs than half a mile to Rochdale; and another branch of rather more than half a mile from Failſworth to Hollinwood Chapel.

The length of this canal is thirty-one miles and a half, with ſix hundred and thirteen feet lockage; which is more particularly as follows: viz. from the junction with the Calder navigation near Halifax to Hebden Bridge, is five miles and a half, with ſeventy-five feet riſe; from thence to Todmarden is four miles, with ninety-ſix feet riſe; from thence to Travis

Mill, is one mile and a half, with one hundred and four feet riſe; from thence to Cleg-hall, (two miles ſhort of Rochdale) is five miles and a quarter, and is level, this is the head level; from thence to Lower Place, near Rochdale, is two miles, with ſixty-two feet fall; from thence to Chaderton Brook, oppoſite Middleton, is four miles and a quarter, with one hundred and twenty feet fall; from thence to near Failſworth, is two miles and three quarters, and is level; from thence to the beginning of Mancheſter is four miles and a half, with eighty-one feet fall; from thence to the junction with the Duke's canal, is one mile, with ſeventy-five feet and a half fall. The two branches are level. Rochdale Canal.

This act of parliament, after ſeveral endeavours and modifications, was obtained in 1794, and incorporates the ſubſcribers under the title of "The Company of Proprietors of the *Rochdale Canal*," with cuſtomary powers to make the canal to join the Calder navigation at Halifax, and the duke of Bridgwater's canal at Mancheſter. And as an indemnification for the expence which has been incurred on the wharfs, &c. belonging to the duke; (the profits of which will be much reduced by thoſe of this canal) the Duke and his heirs are impowered to build and maintain a lock at his expence, on the Rochdale Canal, at or near the Caſtle Field, and is allowed to take there the following *tolls*:

For coal, ſtone, timber, goods, wares, &c. (except flags) which ſhall be conveyed from the Rochdale Canal into the Duke's canal; or from the Duke's canal into the Rochdale Canal, the ſum of *fourteen-pence* per ton, and ſo in proportion for leſs than a ton.

Rochdale Canal.

For every ton of flags, carried as above, *four-pence*, and ſo in proportion.

All perſons who have paid the duties as above, have free liberty to land goods, &c. at any wharf, and to lodge the ſame at any warehouſe, not exceeding ſix days, within the pariſh of Mancheſter, belonging to the Duke of Bridgwater; and that all perſons who ſhall have paid the duties before-mentioned to the Duke for wharfage, &c. for goods, ſhall not be liable to pay any tolls for paſſing through the ſaid lock, with ſuch goods, &c. it being the intent and meaning, that the above rates ſhall be accepted by the Duke, as a full compenſation for the loſs he may ſuſtain by reaſon of the junction, &c.

The above lock to be the property of the Rochdale Company, but the repairs, as well as building, is to be at the expence of the Duke.

The locks on the Rochdale canal are to be of the ſame dimenſion as thoſe already made on the Duke's canal.

The act contains many reſtrictions for protection of the mills on the rivers Irk, Roach, and Irwell, with full inſtructions reſpecting the gauges to be placed for aſcertaining their due quantity of water.

The breadth of ground allowed for the canal, towing path, &c. is thirty yards, except at Slack's Brook, where only eight yards is allowed: in certain parts, are not to deviate from the line laid down in the book of reference without leave; and in no caſe, to deviate more than fifty yards. The reſervoirs are on the ſouth eaſt ſide of the tunnel. Inclined planes are permitted and protected.

Cuts and rail-ways may be made in future to join the canal at certain diſtances, for the uſe of coal-works, mines, &c. Rochdale Canal.

The Aſhton and Oldham Company may complete a junction with the Rochdale Canal near the ſtreet called Piccadilly, in Mancheſter; provided the former canal is made upon a level with the latter. The waſte water of both canals, to be conveyed into the Duke's tunnel, near Bank Top.

The Calder Navigation Company are to build convenient wharfs and warehouſes near the junction at Halifax, for the uſe of the Rochdale Canal Company, and are to receive for all timber, ſtone, coals, &c. which ſhall be conveyed on the Rochdale Canal, and which ſhall be depoſited on ſuch wharf or warehouſe, *one halfpenny* per ton per day, for ſuch timber, goods, &c. unleſs delay ſhall ariſe from froſt, or accident which may happen within the limits of the ſaid Calder navigation; and in caſe the Calder Company neglect to build theſe warehouſes and wharfs, the Rochdale Company may proceed to build.

The company are authoriſed to raiſe 291,900l. to be divided into ſhares of 100l. each; alſo 100,000l. more may be raiſed by mortgage or new ſhares, if the firſt ſum is not ſufficient.

The *rates of tonnage* are not to exceed—

For lime, lime-ſtone, dung, manure, clay, ſand, and gravel, not paſſing through any lock, *one halfpenny* per ton per mile.

For the ſame paſſing through any lock or locks, *one penny* per ton per mile.

Rochdale Canal.

For coal, cannel, ſtone, (except lime-ſtone) and other minerals, not paſſing through any lock, *one penny* per ton per mile.

For the ſame paſſing through any lock or locks, *three halfpence* per ton per mile.

For timber, goods, and other merchandiſe, not paſſing through any lock, *three halfpence* per ton per mile.

For the ſame paſſing through any lock or locks, *two-pence* per ton per mile.

Fractions to be taken as for a quarter of a mile, and as for a quarter of a ton.

The company are further authoriſed to receive for the *wharfage* of coal, lime, lime-ſtone, clay, iron, iron ſtone, timber, ſtone, bricks, tile, ſlate and gravel, *one penny* per ton; and for the *wharfage* of other goods *three-pence* per ton, where the ſame ſhall be reſpectively placed and remain upon any ſuch wharfs or quays, and ſhall not continue thereupon for a longer ſpace than ſix days; except coal, iron, and lime-ſtone, which may remain thereupon for ſix weeks; and timber, clay, lime, iron ſtone, bricks, tiles, ſtone, ſlate, or gravel, which may remain thereupon for three weeks, for the ſaid *one penny* per ton; but if any articles remain longer than the times above ſpecified, then to pay *one penny* per ton per day; except the delay ſhall ariſe from froſt, want of boats, want of water, or neglect of the company.

From the above rates and dues are *exempted*, ſtones, gravel, or ſand, for repairing of any public roads, in any pariſh through which the ſaid canal or cuts ſhall be made. Alſo dung, ſoil, marle, aſhes of coal and turf, or other manure (except lime) for the improvement only of the lands and grounds in any ſuch pariſh. Alſo any material which ſhall be uſed in the

the rebuilding or repairing any mill on the rivers Irk or Roach, or on the river Irwell, below the junction thereof with the Roach, or on the river Calder between Deyne Head and Salter Hebble. The above are not to pass any lock except when the water shall flow from the waste weir of such lock. The goods, &c. not to lie upon the wharfs or quays longer than necessary for loading, unloading, &c. Persons claiming the above exemptions, not being entitled thereto, or afterwards disposing of the articles, &c. shall for every offence forfeit, not exceeding five pounds. Rochdale Canal.

No vessel of less than twenty tons when the water does not, or of less than fifteen tons when the water does flow over the weirs to pass any lock without leave, or paying for that quantity.

Steam engines may be erected on the borders of the canal and supplied with water from the same, not exceeding twenty yards distance from the canal, and returning the surplus water.

The line of this canal passes through a country abounding in coal and other minerals, but particularly in coal; and as it connects those two great manufacturing towns Halifax and Manchester, must tend greatly to the advantages of those towns and their commerce, as well as to the benefit of the country and property in the vicinity of the canal. Halifax, the centre of the broad cloth trade, will also have an easy and certain conveyance by this canal and the Duke of Bridgewater's Canal to the port of Liverpool, and by the Grand Trunk to the heart of England and the ports of Bristol and London.

Somerſet Coal Canal.

SOMERSET COAL CANAL.

Particulars of a Canal from the Kennet and Avon Canal, in the Pariſh of Bradford, in the County of Wilts, to ſeveral Colleries in the County of Somerſet, with Railways and Stone Roads. 34 *Geo. III. Ch.* 86. *John Rennie, Engineer.*

THIS canal joins the Kennet and Avon Canal in the pariſh of Bradford, near Limpley Stoke, and goes parallel with Mitford Brook to Mitford Mill, where one branch takes a weſterly courſe and paſſes Combe Hay, (where is a tunnel, of near three quarters of a mile), Dunkerton, Camerton, to High Littleton; a length of ten miles from the junction, and eight from Mitford Mill, from which place there is a riſe of one hundred and thirty-eight feet. The other branch joins at Mitford Mill, and taking a ſoutherly courſe paſſes Wellow, Foxcote, Writhlington, and goes about a mile beyond Radſtock to Welton Coal Works, being ſeven miles and a half from Mitford Brook, with one hundred and thirty-eight feet riſe; there are ſeveral rail roads in connection with the canal.

The proprietors of this canal are incorporated by the name of "The Company of Proprietors of the *Somerſetſhire Coal Canal*," with the cuſtomary powers for making the ſame and rail ways. The company are not compellable to make rail roads, unleſs the owner or proprietor ſhall enter into ſufficient ſecurity to the amount of the coſt of ſuch roads, to ſupply ſuch a quantity of coal as ſhall produce a certain intereſt, &c. by tonnage on the canal. The ground allowed for the

Somerſet Coal Canal.

the uſe of this canal, towing-path, &c. is thirty yards in breadth, and not to deviate more than one hundred yards from the line laid down in the book of reference. Water for the uſe of Mr. Stephens's works is preſerved; and other works are protected. The canal at the junction with the Kennet and Avon Canal is to be upon a level.

The proprietors are impowered to raiſe the ſum of 80,000l. to be divided into ſhares of 100l. each, to be numbered and a ticket given: if more money is neceſſary, 40,000l. additional may be raiſed.

The allowed *rates of tonnage* are—

For all coal, culm, and coak, carried on the canal, *two-pence halfpenny* per ton per mile.

For all iron ſtone, iron ore, lead ore, calamine, and other minerals, iron, lead, and cinders, carried on the canal, or rail-ways, &c. *four-pence* per ton per mile.

For all lime, lime-ſtone, free-ſtone, tiles, ſlate, gravel, bricks, timber, flag-ſtones, and other ſtones, clay, and ſand, carried on the canal or rail-roads, *three-pence* per ton per mile.

For all cattle, ſheep, ſwine, and other beaſts, carried on the canal, *four-pence* per ton per mile.

For all other goods, wares, &c. carried on the canal or rail-roads, *four-pence* per ton per mile.

Fractions to be taken as for a half mile, and as for a quarter of a ton.

Exemption. Proprietors of coal works, may convey the coal raiſed from ſuch works, and any coak made therefrom, upon rail-

Somerſet Coal Canal.

rail-ways to the canal, without paying any rates, &c. provided the carriage be made according to the direction of the committee.

For *travelling*. For every horſe or aſs, *one penny*.
For every cow or other neat cattle, *one halfpenny*.
For all ſheep, ſwine, and calves, *five-pence* per ſcore.

Five per cent. on the profits is to be deducted until 1000l. ſhall be accumulated as a bank; to be inveſted in government ſecurities, and to be applied to exigencies. When this ſum ſhall be reduced to 500l. the reduction of five per cent. ſhall then again commence, &c. Alſo when the clear profits ariſe to more than ten per cent. the tonnage on coals ſhall be reduced to *two-pence* per ton per mile.

For *wharfage* of coal and coak, remaining more than fourteen days, and other goods more than forty-eight hours, a reaſonable compenſation ſhall be made.

Veſſels laden with hay, ſtraw, materials for repair of roads, or manure, are not to paſs any lock without conſent, unleſs the water flows over the waſte weir, or unleſs boats returning or going to the collieries for a loading, &c. Boats under twenty tons not to paſs any lock without leave, or paying that tonnage.

Owners and occupiers of adjoining lands may uſe pleaſure and huſbandry boats without paying any rates, provided the ſame do not exceed five feet wide and twelve feet long.

This

Somerſet Coal Canal.

This canal, when completed, promiſes great advantages to the proprietors of the immenſe coal-works at its extremity, as well as to the populous towns of Bath and Briſtol. Coal is an article of ſuch great and univerſal requeſt, that every exertion tending to bring it to market at a cheap rate, merits all poſſible commendation.

SWANSEA CANAL.

Swanſea Canal.

Deſcription of a Canal from Swanſea to Hen-noyadd, in the Counties of Glamorgan and Brecon. T. Sheaſly, Engineer.

IN our firſt publication we gave notice, that a line for a canal in this quarter was in contemplation; we have now the ſatisfaction to inform our readers the ſcheme, after much deliberation, has been brought to perfection, and an act of parliament obtained for the ſame.

The line of the canal, as at preſent ſettled, commences at the town of Swanſea in the county of Glamorgan, paſſes Landoor, the copper works of J. Morris, Eſq. at Morris Town, and running parallel with the river Tawe, croſſes the river Twrch, and finiſhes at Hen-noyadd, about four miles beyond Yſtradgunlais.

The length of the canal is ſeventeen miles, with three hundred and ſeventy-three feet riſe, viz. from Swanſea, to oppoſite Pont ar Taw, being about eight miles and a quarter, has one hundred and five feet riſe; from thence to Pont Gwaynclawdd eight miles further, has two hundred and thirty-ſeven feet riſe; the remaining three quarters of a mile has a riſe of thirty-one feet.

The

Swanſea Canal.

The Act of Parliament 34 Geo. III. ch. 109. incorporates the proprietors of this canal under the title of "The Company "of Proprietors of the *Swanſea Canal*," and gives the uſual powers for conſtructing the canal; with ſome reſtrictions reſpecting water belonging to certain mills, and indemnities to the collieries of Meſſrs. Smith and Williams at Landoor. That part of the canal beginning at a brook near Landoor, to a brook near Morris Town, a diſtance of near one mile and a half, is to be made and conſtructed by his grace the duke of Beaufort, and together with the tolls, to remain the private property of his grace; this part, goes by the name of Mr. Morris's Canal.

The breadth of ground allowed for the canal, towing-path, &c. is twenty-ſix yards. The company are authoriſed to raiſe 60,000l. to be divided into ſhares of 100l. each, alſo 30,000l. more if the firſt ſum is not ſufficient. No perſon &c. to hold more than twenty ſhares, and for each ſhare a ticket or inſtrument may be given on paying to the clerk the ſum of *two ſhillings*, which ticket ſhall be admitted in all courts of law as evidence of the title of ſuch ſubſcriber or proprietor. The canal to be completed in four years from the commencement of the Act.

The *rates of tonnage* are not to exceed—

For iron, goods, merchandize, &c. (except pig iron, iron-caſtings, calcined iron ore, iron-ſtone, iron ore, rotten-ſtone, charcoal, coal, culm, ſtone-coal, coaks, cinders, timber, ſtone, tiles, bricks, clay, lime-ſtone, lime, ſand, and all kinds of manure), *four-pence* per ton per mile.

For iron caſtings, *three-pence* per ton per mile.

For pig iron, *two-pence halfpenny* per ton per mile.

Swanſea Canal.

For iron-ſtone, calcined iron ore, iron ore, rotten ſtone, coals, culm, ſtone-coal, coaks, cinders, charcoal, timber, ſtone, tiles, bricks, and clay, *three-pence halfpenny* per ton per mile.

For lime-ſtone, lime, and all kinds of manure, *one penny*, per ton per mile.

For lime, lime-ſtone, and manure paſſing from Swanſea to the South Boundary of the Fee of Trewyddfa (about two miles) only *one halfpenny* per ton per mile ſhall be paid.

The tolls to be taken on that part of the canal belonging to the Duke of Beaufort are not to exceed the above tolls allowed to the company.

The rates may be lowered.

No boat under fifteen tons when the water does not, nor under ten tons when the water does flow over the waſte weir, to paſs any lock without leave, or paying that tonnage.

Many rail-ways and collateral cuts are permitted to be made, and others at certain places are forbidden to be made. There is alſo a power for making and preſerving inclined planes.

The courſe of this canal is through a country abounding in ores, lime-ſtone, and other valuable minerals, which by means of this canal will, at a cheap rate of carriage, be brought to market, and thereby enable the founders, &c. to ſell at reduced and low prices, which muſt ever be conſidered as highly neceſſary to extend commerce, and render ſuch undertakings truly profitable.

River Trent, to Amend.

RIVER TRENT, TO AMEND.

The Act for improving the navigation of the Trent, obtained this ſeſſion, (34 Geo. III. ch. 95.) enables the proprietors to make a ſide cut, commencing at the mouths of the Grand Trunk Canal and the River Derwent, which will croſs the Erewaſh Canal and River, and paſſing Beeſton join the Nottingham Canal, ſkirt the ſouth ſide of Nottingham Town, and fall into the Trent below Trent Bridge. The length of this cut is ten miles, with a fall of twenty-eight feet; by which twenty-one ſhoals and two bridges will be avoided in a length of thirteen miles, on the old navigation or river. The canal locks into the river at Beeſton Meadow. For completing this, the powers of former acts are extended to this, which allows twenty yards for the breadth of the canal, towing-path, &c. Certain towing-paths are to be widened, new ones made, in places on both ſides the river, &c. The proprietors are required ſo to amend the river, that at all ſeaſons, and in all places, there ſhall be thirty inches of water; and that boats of forty tons lading may navigate. The capſtern or haling machine, at Nottingham, is to be purchaſed by this company, of the corporation of Nottingham, for the ſum of 500l. The fiſheries on the river are amply protected.

For the purpoſes of this Act the company are authoriſed to raiſe the ſum of 13,000l. to be divided into ſhares of 50l. each; no perſon to hold more than four ſhares: if the former ſum is inſufficient, 10,000l. more may be borrowed on the tolls, &c.

The

River Trent, to Amend.

The following *rates* are allowed to be taken over and above all other dues granted by former acts, viz.

For all goods, wares, merchandiſe, &c. carried from, to, or between Wilden Ferry and Gainſborough, *nine-pence* per ton.

From Wilden Ferry to Newark upon Trent, or the contrary, *ſix-pence* per ton.

From Wilden Ferry to Nottingham Trent Bridge, or to the Nottingham Canal, or the contrary, *three-pence* per ton.

From Gainſborough to Nottingham Trent Bridge, or the contrary, *ſix-pence* per ton.

From Gainſborough to Newark, or the contrary, *three-pence* per ton.

From Nottingham Trent Bridge to Newark, or the contrary, *three-pence* per ton.

And ſo in proportion for a greater or leſs quantity than a ton, or for any leſs diſtance than the whole length, between the reſpective places above-mentioned.

No more than half the above rates ſhall be paid for coals, plaiſter, and lime, upon any part of this navigation, except for veſſels navigating between Gainſborough and Dunham Shoal, and navigating no higher up the ſaid river.

Alſo in lieu of the above rates, only *one halfpenny* per ton ſhall be paid for the paſſage of any coals, plaiſter, lime, or other goods, wares, &c. carried on this river to Dunham Shoal and no further up, and ſo proportionably, according to the diſtance; in caſe ſuch coal, &c. ſhall not be conveyed the whole diſtance from Gainſborough to Dunham Shoal: and no tonnage of any kind ſhall be paid for any coals, &c. conveyed down the river from Dunham Shoal to Gainſborough, or from any intermediate place, and not brought from any place higher up the river than Dunham Shoal.

River Trent, to Amend.

Alſo, the Company are not to take any further or additional tolls, for any coal navigated on that part of the river Trent, lying between the Erewaſh Canal and Newark, or on any ſide cuts, (the Beeſton Meadow cut excepted) other than the tonnage allowed to be taken before the paſſing of this act.

The annual rent paid to this company by the proprietors of the Soar navigation and the Erewaſh canal of 5l. is to ceaſe, and inſtead thereof every boat, laden, croſſing the Trent at ſuch place, is to pay *ſix-pence*.

None of the above allowed rates are to take place till the ſum of 13,000l. be expended in the purpoſes of this act.

When the canal is completed for navigating thereon, ſimilar rates may be taken to thoſe allowed by former acts for navigating on the river. Boats paſſing from the Grantham Canal are not liable to the additional tolls, if the ſame paſs along the Trent river, and not through the Beeſton Cut; but to pay according to the rates ſettled in the Grantham Canal, Act, ſee Page 97.

Veſſels paſſing to or from the Erewaſh Canal, may paſs on the Beeſton Cut at the river rates, if the water in the river is not kept of a ſufficient depth. Perſons claiming *exemption* from rates, not to paſs any lock, without giving three hours notice.

The profits on this navigation are not allowed to exceed ſeven per cent.

The purport of this Act is a ſtrong evidence in favour of the ſaying of our old and reſpected Maſter Brindley, " that rivers were made for the purpoſe of ſupplying canals."

WYRLEY

WYRLEY AND ESSINGTON CANAL, EXTENSION.

Wyrley and Eſſington Canal, Extenſion.

IN our former Addenda, Page 12, we gave an account of what was originally planned reſpecting this Canal. This Seſſion (34 Geo. III. ch. 25) an act has been obtained for extending the canal ſo as to join the Coventry Canal at Huddlesford, near Lichfield; reſpecting which, in addition to the former account, we have to add, that from Birchill near Walſall, the extenſion canal takes a north courſe up to the coal works at Lords Hay near Wyrley. At Pelſall-Wood, the canal takes an eaſt courſe, paſſing through Pelſall-Wood, by Brown Hills, over Cannock Heath, on the ſouth ſide of Lichfield, and joins the Coventry Canal oppoſite Huddlesford. On the weſt ſide of Cannock Heath, a branch goes to the ſouth by Walſall Wood to the lime works at Hay Head. The total length of this canal and branches is thirty four miles and a half, with two hundred and ſixty-four feet fall from Cannock Heath to the Coventry Canal.

From Wolverhampton to Birchill is ſeven miles and a half, and level; from thence to the firſt lock on Cannock Heath is eight miles and level; from thence to the junction is ſeven miles and a half. Of the branches, that to Wyrley Bank is three miles and a half; that to Lords Hay at Wyrley is two miles and a half; and that to Hay Head Lime Works is five miles and a half; they are all level. There is alſo a ſhort cut to Mr. Vernon's collieries at Aſhmore Park. The other branches mentioned in the former Addenda are relinquiſhed.

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None of the above allowed rates are to take place till the ſum of 13,000l. be expended in the purpoſes of this act.

When the canal is completed for navigating thereon, ſimilar rates may be taken to thoſe allowed by former acts for navigating on the river. Boats paſſing from the Grantham Canal are not liable to the additional tolls, if the ſame paſs along the Trent river, and not through the Beeſton Cut; but to pay according to the rates ſettled in the Grantham Canal, Act, ſee Page 97.

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The

Wyrley and Effington Canal, Extenſion.

The neceſſary powers of the former act are extended to the things authoriſed by this act; no water is to be taken from the Birmingham or from the Staffordſhire Canal.

For the purpoſes of this Act the proprietors are authoriſed to raiſe the ſum of 75,000l. to be divided into ſhares equal to the former ſhares.

A further ſum of 40,000l. may be raiſed, if neceſſary.

The following *rates of tonnage* are allowed to be taken:

For all coals, coak, iron, iron-ſtone, rock-ſtone, bricks, tiles, and other minerals, carried on this canal or cut, and which ſhall enter the Wyrley and Effington Canal, and not paſs through the lock at or near Catſhill, *nine-pence* per ton, and ſo in proportion.

For all coals, coak, iron, iron-ſtone, rock-ſtone, bricks, tiles, and other minerals, (except ſuch as have been brought from the Wyrley and Effington Canal, and for which the ſum of *nine-pence* per ton ſhall have been paid as aforeſaid) carried on this canal or cut, and not paſs through the lock at or near Catſhill, *nine-pence* per ton, and ſo in proportion.

For all coals, coak, iron, iron-ſtone, rock-ſtone, bricks, tiles, and other minerals, for which the ſum of *nine-pence* per ton ſhall have been paid upon the Wyrley and Effington Canal, or upon this canal, and ſhall afterwards paſs through the lock at or near Catſhill, the further ſum of *one ſhilling* and *three-pence* per ton, and ſo in proportion.

For all coals, coak, iron, iron-ſtone, lime-ſtone, rock-ſtone, bricks, tiles, and other minerals, which ſhall be produced or gotten from or out of any lands or grounds ſituate below the lock, at or near Catſhill, and ſhall be carried upon any part of this

this canal between Catſhill and Huddlesford, *two ſhillings* per ton, and ſo in proportion. Wyrley and Eſſington Canal, Extenſion.

For all ſlack or ſmall and inferior coal for the purpoſe of burning lime-ſtone or bricks, lime-ſtone and lime, which ſhall be carried upon this canal or cut, and not paſs through the lock at or near Catſhill, *ſix-pence* per ton, and ſo in proportion.

For all lime for which the ſum of *ſix-pence* per ton ſhall have been paid upon the Wyrley and Eſſington Canal, or upon this canal or cut, and ſhall afterwards paſs the lock at or near Catſhill, the further ſum of *nine-pence* per ton, and ſo in proportion.

Provided always, that all coals, coak, iron, iron-ſtone, lime, lime-ſtone, rock-ſtone, bricks, tiles, and other minerals, for which the ſaid rate of *nine-pence* a ton ſhall have been paid upon the Wyrley and Eſſington Canal, ſhall afterwards be allowed to paſs upon any part of this canal and cut (except through the lock at or near Catſhill) without being liable to the payment of any rate whatſoever; and that all coals, ſlack, or ſmall and inferior coal for the purpoſes aforeſaid, coak, iron, iron-ſtone, lime, lime-ſtone, rock-ſtone, bricks, tiles, and other minerals, for which the ſaid rate of *nine-pence* or *ſix-pence* per ton (as the caſe may be) ſhall have been paid upon this canal or cut, ſhall afterwards be allowed to paſs upon any part of the ſaid Wyrley and Eſſington Canal, without being liable to the payment of any rate whatſoever.

The tonnage granted by the former act is reduced by this act on lime, lime-ſtone, and ſlack of coal to *ſix-pence* per ton.

Wyrley and Eſſington Canal, Extenſion.

The Company are obliged to purchaſe ſhares of former proprietors who ſhall not be ſatisfied with the extenſion. The conduit pipes which ſupply Lichfield with water are protected.

This canal, with its branches, embraces a line of country moſt plentifully abounding with coal, lime, &c. its general courſe is over land of ſmall value, much of it waſte land. The very extenſive coal and other mines, the property of the Marquis of Stafford, Mr. Pulteney, Mr. Anſon, and Mr. Vernon, will now be improved beyond calculation, and in proportion of the advance of income to the noble proprietors, will be the advantage to the public, by making articles of ſuch general conſumption acceſſable and cheap.

Wiſbech Canal.

WISBECH CANAL.

Deſcription of a Canal from Wiſbech in the County of Cambridge, to join the River Nene in the Pariſh of Outwell, in the County of Norfolk. 34 *Geo. III. Ch.* 92.

THERE has been heretofore a water courſe, navigable for ſmall veſſels, from Wiſbech to the river Nene (the Old Nene) but the ſame is now gone quite to decay, and ſome parts entirely filled up near the Town of Wiſbech. It is intended the preſent navigation ſhall be by a ſtraiter and ſhorter courſe. It will join the Wiſbech river at the Old Sluice in the Town of Wiſbech, paſs Elm, and at Outwell communicate with Well Creek and the river Nene (the Old Nene) in the pariſh of Outwell, in the Iſle of Ely, and in the county of Norfolk. The length is about ſix miles.

The

Wiſbech Canal.

The proprietors of this canal are incorporated under the name of "The *Wiſbech Canal Company*," with the neceſſary powers for making the ſame, and ſupplying it with water from the Wiſbech river; and are not to deviate in making the canal more than one hundred yards from the line drawn in the book of reference, without conſent; for the canal, towing-path, &c. twenty yards of ground is allowed to be taken. The cottages, &c. which have been built on the ſcite of the old river, are to be removed, the Company providing for the occupiers proper plots of ground within a convenient diſtance of the Town of Wiſbech, or to make a proper ſatisfaction; for this purpoſe, the Biſhop of Ely is authoriſed to grant out parcels of the Waſte, in the Manor of Wiſbech Barton.

For the purpoſes of this Act, the Company are authoriſed to raiſe the ſum of 14,000l. to be divided into ſhares of 105l. each, to be numbered, and a ticket given for each. No perſon to hold more than five ſhares. If the former ſum is not ſufficient, the Company may raiſe an additional ſum of 6,000l.

The following *rates of tonnage* are allowed to be taken:

For every chaldron of coals, hundred of battens, half hundred of ſingle deals, quarter of a hundred of double deals, load of fir timber, four packs of wool, five quarters of oats, load of turf, reed, ſedge, hay, flax, or hemp, five hundred pantiles, thouſand flat tiles, five hundred bricks, twenty cubic feet of ſtone, pipe, butt, puncheon, or piece of wine or ſpirituous liquors, ſix ſacks of flour, five barrels of ale, beer, or porter, chaldron of lime, *one ſhilling*.

Wiſbech Canal.

For every five quarter of wheat, barley, muſtard ſeed, hemp ſeed, rape ſeed, line ſeed, rye, peas or beans, *one ſhilling and ſix-pence.*

For all other goods, &c. *one ſhilling* per ton, and ſo in proportion.

Exemption from Rates. Officers or ſoldiers on their march, with their horſes, arms, baggage, &c. timber or other ſtores for the uſe of his Majeſty's ſervice; any materials belonging to, or for the uſe of the Corporation of Bedford Level, or any of their works; provided proper certificates be produced; any ſtone, gravel, &c. for the purpoſe only of making or repairing the Wiſbech turnpike road, or any other public road in any pariſh through which the canal ſhall paſs. Huſbandry boats alſo may be uſed by owners of adjoining lands, (not to carry lime or lime-ſtone) but not to paſs any lock without paying the cuſtomary rate of tonnage.

Boats under three tons lading to pay for that quantity, if there ſhall be water ſufficient for that quantity.

Boatmen paſſing any locks, upon requeſt, to have a ticket gratis, ſtating the quantity of tonnage, and the day paid; and if ſuch boat ſhall paſs empty, and return laden within twenty-one days, the tonnage therein expreſſed to be paid ſhall be deducted from ſuch lading, &c. returning; or if any boat ſhall have paſſed laden, then to be allowed thirty days, to paſs free in. Boats laden with turf may paſs the lock at Outwell, paying only the amount of the tonnage, for ſuch turf as ſhall be in the boat, provided the ſame be not navigated beyond the farm houſe of James Fiſher.

For

For goods lying on *wharf* more than twenty-four hours a reaſonable allowance ſhall be made. Wiſbech Canal.

For *craneage* of every ton of goods (except coals) *ſix-pence.*

The River Nene, from Outwell Church to Salters Load, is to be put into a navigable ſtate, and all boats paſſing into or out of this canal, into the River Nene or Well Creek, are to pay for every ton of goods, wares, &c. *three-pence:* out of which, 100l. annually is to be paid to the commiſſioners of the Nene Navigation; and the remainder is to be applied for ſupporting the navigation between Outwell and Salters Load Sluice. Boats which have paid the above toll are not to pay the dues heretofore taken at Salters Load, or Stand-ground Sluices. Money advanced by this company for improving the navigation between Outwell and Salters Load, is to be repaid out of the firſt money ariſing from the above tolls, with intereſt; and after the above, and all other outgoings are ſatiſfied; the ſurplus is to be laid out in government ſecurities as a fund for future wants.

RIVER WELLAND NAVIGATION, TO AMEND.

River Welland Navigation, to Amend.

Particulars of an Act for improving the Navigation of the River Welland, and for making a new Cut from thence to the River Witham, at Wyberton Roads, near Boſton, in Lincolnſhire, and for draining the ſurrounding Country, &c. 34 *Geo. III. Ch.* 102.

THE act commences by ſtating the out-falls of the River Welland being very defective, &c. and appoints John Hudſon, of Kenwick Thorpe; George Maxwell, of Fletton; and Edward

River Welland Navigation, to Amend.

ward Hare, of Caſtor, commiſſioners for executing the powers and purpoſes of this act. The commiſſioners are directed to cleanſe the river Welland, from the lock to be made above the ſluice in the Vernatt's Drain, to a place in the pariſh of Surfleet, called Shepherd's Hole; here to make a dam acroſs the river, ſufficient to ſtem the tide, and to reſiſt the land floods, and from thence to make a new navigable cut at, or near Hooton's Gibbet, acroſs the Salt Marſhes to Wyberton Roads, as near the Ship Ale-Houſe as may be.

The new cut at the commencement at Hooton's Gibbet is not to be leſs than four feet below the pointings of the preſent ſluice, at the out-fall of Vernatt's Drain, and is to be continued from thence on an inclined plane, of at leaſt four inches in a mile, to the termination: the new cut is to be conſtructed, not leſs than fifty feet wide at bottom, with a batter of not leſs than two feet on each ſide, for every foot in depth; the forelands on the north ſide alſo are not to be leſs than thirty feet wide; and on the ſouth ſide not leſs than fifty feet; the ſouth bank of the new cut is to be, not leſs than ſixty feet at the baſe, nor leſs than thirty feet wide at the top, and eleven feet in perpendicular height: the north bank is not to be leſs than thirty feet at the baſe, nor leſs than ſix feet at the top, and eleven feet in perpendicular height. There is alſo to be made a new ſea ſluice, with pointing doors to ſea and land, the threſhold thereof to be laid one foot below low water mark, at Wyberton Roads; the water way of this ſluice is not to be leſs than fifty feet wide in the clear, and by the ſide of the ſaid ſea ſluice is to be made a navigable lock, eight feet wide and ſixty feet long, for boats, &c. there are alſo directions reſpecting the adjoining river, waters, &c.

For the beneficial purpoſes of draining propoſed by this act, the commiſſioners are authoriſed to lay certain taxes on certain lands, which are to be paid by tenants and deducted from their rents. River Welland Navigation, to Amend.

The commiſſioners are empowered to borrow money on ſecurity of taxes, tolls, and pontage.

The *rates of tonnage* for all rafts, barges, &c. which ſhall paſs through the navigable lock, are—

For every chaldron of coals, *ſix-pence.*

For every laſt of oats or malt, every half laſt of wheat, rye, barley, barley big, beans, peaſe, cole, linſeed, hempſeed, or muſtard ſeed; every ton of iron, ſalt, lead, rags, tobacco-pipe clay, pebbles, or cobles; every ton of reed, ſedge, hay, flax, hemp, or turves; every butt of currants, chaldron of lime, and chaldron of grindſtones; every two pipes, three hogſheads or puncheons, eight barrels or half hogſheads of wine or other liquor; every eight packs of wool; every ſixteen kilderkins, thirty-two firkins, quarter barrels and buſhels of ſand; every five hundred pan-tiles, or paving-tiles, five hundred of bricks, twenty feet of ſtone, one hundred of battens, and half a hundred of deals, *one ſhilling.*

For all other goods, wares, &c. *one ſhilling* per ton. Alſo for every fifty feet of fir timber, and forty feet of all other timber, *one ſhilling*; whether floated through the ſaid lock, or brought by any lighter, barge, &c.

A bridge is to be built over the new cut at Foſdike Inn; and the public way or paſſage over Foſdike Waſh is to be amended, and rendered ſafe and commodious for paſſengers

and

River Welland Navigation, to Amend.

and cattle, at all times of tide, and in all ſeaſons; for which the following *tolls* or *pontage* are to be paid, when the ſame is duly completed, viz.

For every coach, chariot, &c. with four wheels, and drawn by leſs than four horſes, *ſix-pence*; if drawn by four horſes or more, *one ſhilling*.

For every chair or pleaſure cart drawn by one horſe, *three-pence*; and by two horſes, *ſix-pence*.

For every waggon, wain, &c. with four wheels, and drawn by three or four horſes or more, *one ſhilling and ſix-pence*; and by two horſes, *one ſhilling*.

For every cart, &c. drawn by two or more horſes, *nine-pence*; and by one horſe, *ſix-pence*.

For every horſe, mare, &c. *three halfpence*.

For every ſcore of oxen, or neat cattle, *ten-pence*, and ſo in proportion.

For every ſcore of ſwine, calves, ſheep, or lambs, *five-pence*.

Exemptions. Perſons going to or from their lands interſected by the new cut, their horſes, cattle, carriages, &c.

When the ſeveral purpoſes authoriſed by this act are performed, the commiſſioners are to make a general award reſpecting all accounts, all lands liable to be taxed, &c. When the new cut, and all other matters authoriſed, are to be tranſferred into the hands of certain truſtees, named; with a mode of perpetual ſucceſſion; the act alſo contains regulations reſpecting the bare ſands recovered; and other matters appertaining to the general intentions propoſed and authoriſed.

WARWICK

WARWICK AND BRAUNSTON CANAL.

Warwick and Braunſton Canal.

An Account of a Canal from the Warwick and Birmingham Canal at Warwick, to the Oxford Canal at Braunſton, in the County of Northampton. 34 *Geo. III. Ch.* 38.

THIS canal joins the Warwick and Birmingham Canal, in the pariſh of Budbrook, on the north weſt ſide of the town of Warwick, and croſſing the Avon, proceeds by Radford, Offchurch, Long Itchington, where it croſſes the river Watergall; paſt Lemington Haſtings, Granborough, where it croſſes the river Leame; and at Braunſton joins the Oxford Canal; the length about twenty miles.

The proprietors are incorporated by the name of "The "Company of Proprietors of *The Warwick and Braunſton* "*Canal* Navigation:" with the powers neceſſary and cuſtomary for making the ſame; thirty yards of ground in breadth are allowed for the canal, towing-path, &c. but not to deviate from the line laid down in the book of reference, without conſent. The junction of this canal with the Warwick and Birmingham Canal is to be upon a level; and the waſte water from the latter canal is to be appropriated to the uſes of this canal. No water is to be taken from the Priory Mill Pools; the rivers Avon or Leame, Saltisford Brook, or Myton Brook.

For the purpoſes of this act, the proprietors are authoriſed to raiſe the ſum of 100,000l. to be divided into ſhares of

Warwick and Braunſton Canal.

100l. each: a further ſum of 30,000l. may be raiſed, if neceſſary: no perſon to have more than fifteen ſhares.

The allowed *rates of tonnage* are—

For all coals, iron, timber, &c. carried on the canal, not exceeding eight miles, and paſſing a lock or locks, *two-pence* per ton per mile.

For all coals, iron, timber, &c. carried on the canal more than ſeven, and not exceeding fifteen miles, *two-pence* per ton for the firſt ſeven miles; and *one penny* per ton for every mile beyond the ſeven miles, and not exceeding thirteen miles.

For all coals, iron, timber, &c. carried on the canal, and not paſſing any lock, *three-halfpence* per ton per mile.

For all coals, iron, timber, &c. carried the whole length of the canal, or more than thirteen miles, *three-halfpence* per ton per mile.

For lime and lime-ſtone, only half the above tolls ſhall be paid.

For free-ſtone, *three-halfpence* per ton per mile; empty boats paſſing for the purpoſe of fetching free-ſtone, to go toll free.

Fractions to be taken as for a mile, and in proportion for a leſs quantity than a ton.

Wharfage, exceeding twenty-four hours, a reaſonable compenſation ſhall be made.

Exemption from rates. Paving ſtones, gravel, ſand, &c. for making and repairing of roads; dung, ſoil, marle, or other manure, (lime and lime-ſtone excepted,) for the improvement only of the lands of any perſon whoſe grounds, &c.

ſhall

ſhall have been taken for the uſes of this canal; provided the ſame do not paſs any lock, but when the water ſhall flow over the waſte weir. Warwick and Braunſton Canal.

No boat under twenty tons lading, or leſs than ſeventy feet in length, is to paſs any lock without leave. Owners and occupiers may uſe pleaſure and huſbandry boats, not exceeding five feet in breadth; the ſame not to paſs any lock, or carry for hire.

The Oxford Canal Company, as an indemnification, are authoriſed to take for their own uſes, over and above all other rates, the following *rates of tonnage.*

For all coals carried out of this canal, into the Oxford Canal, *two-ſhillings and nine-pence* per ton, and ſo in proportion for a leſs quantity.

For all other goods, wares, &c. (except lime, lime-ſtone, and manure) carried out of this canal, into the Oxford Canal, or the contrary, (except ſuch as ſhall be *bona fide* navigated from the Coventry Canal, or from any intermediate place between the ſaid Coventry Canal and this canal, into this canal, *four ſhillings and four-pence* per ton, and ſo in proportion.

For all lime, and lime-ſtone, carried out of this canal into the Oxford Canal, *ſix-pence* per ton, and ſo in proportion.

No other than the above rates are to be taken by the Oxford Canal Company in reſpect of any coals, goods, &c. (except lime and lime-ſtone, not paſſing immediately from this canal to the Grand Junction Canal) which ſhall be carried out of this canal, along the Oxford Canal, immediately into

Warwick and Braunſton Canal.

the Grand Junction Canal, or the contrary; or from this canal along the Oxford Canal, to or towards the Coventry Canal, and upon no other part of the Oxford Canal.

This company guarantee that, if after the completion of this canal, the quantity of coals navigated on the Oxford Canal, and laid down annually at Willoughby Wharf, ſhall not amount to three hundred and twenty-four tons, to pay to the Oxford Company, *two ſhillings and nine-pence* per ton, for every ton ſhort of that quantity, annually. If the Oxford Company ſhall cauſe a reduction of rates to be made, for navigating to the north of Braunſton, the above granted rates, &c. are to experience a ſimilar reduction.

The amount of the above ſpecified rates are to go to, and make part of the ſums, which the Grand Junction Company have guaranteed to the Oxford Company. The water of this canal is to be kept ſix inches higher, than the water of the Oxford Canal.

By this canal, and thoſe with which it is connected, an inland water communication will be completed from Birmingham to the metropolis, in a pretty ſtraight line, of about one hundred and forty-two miles, the diſtance by the neareſt land route is about one hundred and ten miles; when therefore all circumſtances attendant upon making canals are conſidered, it is not to be expected a ſhorter line, conſiſtent with general utility to the intermediate places, can be effected. The great quantity of ponderous goods daily coming from Birmingham, and the neighbouring manufacturing towns to the London market, muſt cauſe this water communication with

the Britiſh Emporium, to ſpread many and laſting benefits to the induſtrious manufacturer, and to the venturous merchant. As we have taken ſo many opportunities of pointing out the increaſed conſumption, and other great advantages attending, being able to convey the manufactures and produce of the interior parts of the kingdom to its ſeveral ports, we ſhall not now again repeat them; but diſmiſs this part of our labour, by hoping that all the advantages promiſed, and greater, may attend theſe patriotic undertakings.

Warwick and Braunſton Canal.

FINIS.

ERRATA.

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63	line 4	For every ton of old or pig iron, &c. read, one penny *halfpenny*.
79	. . 7	Read, for two years, *or* until, &c.
111	. . 21	Upon the cut to Tanworth, read, *one halfpenny*, &c. inſtead of one penny halfpenny.
114	. . 26	Read, *halfpenny*, inſtead of farthing.
158	. . 1	Read, *two-pence*, inſtead of four-pence.
167	. . 3	Read, *three-halfpence*, inſtead of three-pence halfpenny.

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